

SCIENCE

THE MAIN BOOK

By A Group Of Supervisors

SECOND TERM



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Unit 1

Chemical Reactions.



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Chemical Reactions

Lesson **1** Chemical Combination.

Lesson **2** Chemical Compounds.

Lesson **3** Chemical Equations and Chemical Reactions.



Unit Objectives :

By the end of this unit, students will be able to :

- Distinguish between the atom and ion further to their behaviour in chemical reactions.
- Compare between metals and nonmetals.
- Identify the concept of ionic bonds and covalent bonds.
- Design a model for ionic bond and covalent bond molecules.
- Identify the concept of valency.
- Identify the concept of chemical formula and the atomic group.
- Write the most famous symbols of elements and compounds formulae.
- Identify the concept of acids and alkalis.
- Understand the concepts of chemical reactions and chemical equations.



- Identify the relation between matter conserving law and the chemical reaction.
- Express chemical reactions via balanced symbolic and word equations.
- Carry out experiments to some types of chemical reactions.
- Give examples of chemical reactions from life, environment and industries.
- Highlight the mutual relation between technology and chemical reactions.
- Appreciate the benefits of experimental methods in chemical reactions and their control.
- Give examples of the positive and negative social attitudes toward chemical reactions.
- Appreciate the role of scientists in the environmental discoveries.
- Appreciate the Glorious God grants and the marvelous creation in the universe.
- Appreciate the efforts of scientists in the field of chemical reactions.

Lesson

1

Chemical Combination



What are the types of elements ?

- The number of the well known elements up till now is 118 elements.
- These elements can be classified according to their properties and electronic structure into :



First

Metals

Second

Nonmetals

Third

Noble (inert) gases

► Enrichment information

In the 19th century, Berzelius (1779 - 1848) was the first scientist who classified elements into metals and nonmetals.



So, in this lesson, we will study :

- Properties of metals.
- Properties of noble (inert) gases.
- Properties of nonmetals.
- Chemical bonds and their types.



FIRST

Metals

Metals

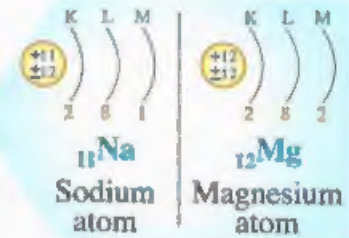
They are elements which contain 1 or 2 or 3 electrons in the outermost energy level.

➤ **Properties of metals :**



1

They are elements which contain less than 4 electrons (1 or 2 or 3 electrons) in the outermost energy level.



2

They are solids except **mercury (Hg)** which is the only liquid metallic element.



3

They have metallic luster.



4

They are good conductors of heat and electricity.



5

They are malleable and ductile.



The behaviour of atoms of metals during the chemical reaction

- During the chemical reaction, atoms of metals tend to give their outermost electrons to other atoms **G.R.**

To complete their outermost energy level with electrons.

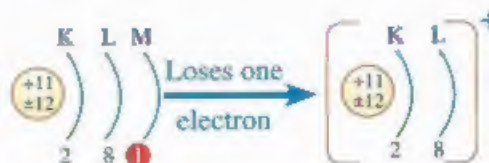
- The atom becomes a positive ion when it loses an electron or more **G.R.**

Because the number of positive protons becomes more than the number of negative electrons.


Positive ion

It is an atom of a metallic element that loses an electron or more during the chemical reaction.


Example : Sodium atom

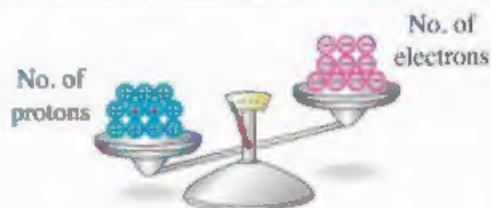


A neutral sodium atom Na

It contains :
 11 electrons
 (11) protons

A positive sodium ion (Na^+)

It contains :
 10 electrons
 (11) protons

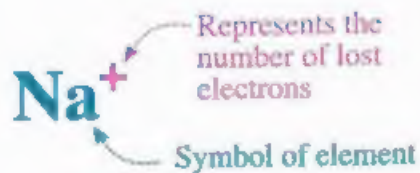


In positive sodium ion (Na^+)
 no. of protons is **more than**
 no. of electrons

From the previous explanation we conclude that :

The positive ion

- The number of protons in its nucleus is **greater than** the number of electrons revolving around it.
- The number of energy levels around its nucleus is **less than** the number of energy levels in the atom.
- Carries a number of positive charges **equals to** the number of lost electrons from the neutral atom.



Symbol of a positive sodium ion



Examples of atoms of metals and their behaviour during the chemical reaction :

Magnesium
24
Mg
12

During the chemical reaction, the magnesium atom (**Mg**) loses two electrons and changes into a positive ion (**Mg⁺²**), which carries two positive charges.



Loses two
electrons



Neutral magnesium atom (Mg)

It contains :

12 electrons 12 protons
12 neutrons 3 energy levels

Positive magnesium ion (Mg⁺²)

It contains :

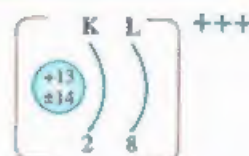
10 electrons 12 protons
12 neutrons 2 energy levels

Aluminium
27
Al
13

During the chemical reaction, the aluminium atom (**Al**) loses three electrons and changes into a positive ion (**Al⁺³**), which carries three positive charges.



Loses three
electrons



Neutral aluminium atom (Al)

It contains :

13 electrons 13 protons
14 neutrons 3 energy levels

Positive aluminium ion (Al⁺³)

It contains :

10 electrons 13 protons
14 neutrons 2 energy levels

? Exercise 1

Complete :

1. The number of known elements up till now is elements.
2. All metals are except which is a liquid.
3. Metals have less than electrons in their outermost shell.

Answer

1. 118
2. solids – mercury
3. four

SECOND

Nonmetals

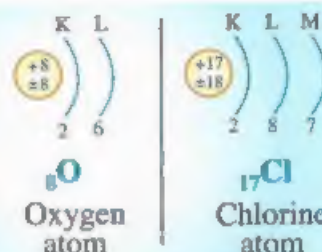
**Nonmetals**

They are elements which contain 5 or 6 or 7 electrons in the outermost energy level.

Properties of nonmetals :

1

They are elements which contain more than 4 electrons (5 or 6 or 7 electrons) in the outermost energy level.



2

Some of them are solids and others are gases except **bromine (Br)** which is the only liquid nonmetallic element.



3

They have no luster.



4

They are bad conductors of heat and electricity except **graphite (carbon)** which is a good conductor of electricity.



5

They are not malleable or ductile (brittle).





The behaviour of atoms of nonmetals during the chemical reaction

- During the chemical reaction, atoms of nonmetals tend to gain electrons from other atoms **G.R.**

To complete their outermost energy level with electrons.

- The atom becomes a negative ion when it gains an electron or more **G.R.**

Because the number of negative electrons becomes more than the number of positive protons.

Negative ion

It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.

Example : Nitrogen atom



A neutral nitrogen atom N

It contains :
7 electrons
(7) protons

A negative nitrogen ion (N^{3-})

It contains :
10 electrons
(7) protons

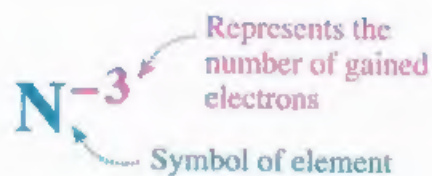


In negative nitrogen ion (N^{3-})
no. of electrons is **more than**
no. of protons

From the previous explanation we conclude that :

The negative ion

- The number of protons in its nucleus is **less than** the number of electrons revolving around it.
- The number of energy levels around its nucleus **equals to** the number of energy levels in the atom.
- Carries a number of negative charges **equals to** the number of gained electron(s).



Symbol of a negative nitrogen ion

Examples of atoms of nonmetals and their behaviour during the chemical reaction :



During the chemical reaction, the chlorine atom (Cl) gains one electron and changes into a negative ion (Cl^-), which carries one negative charge.



Neutral chlorine atom (Cl)

It contains :

17 electrons 17 protons
18 neutrons 3 energy levels

Negative chlorine ion (Cl^-)

It contains :

18 electrons 17 protons
18 neutrons 3 energy levels



During the chemical reaction, the oxygen atom (O) gains two electrons and changes into a negative ion (O^{2-}), which carries two negative charges.



Neutral oxygen atom (O)

It contains :

8 electrons 8 protons
8 neutrons 2 energy levels

Negative oxygen ion (O^{2-})

It contains :

10 electrons 8 protons
8 neutrons 2 energy levels

What happens when ...?

You hammer a piece of carbon and why ?

- ➡ It will be fragmented easily, because carbon is from nonmetals which are not malleable.

NB

A hydrogen (${}_1\text{H}$) atom and a carbon (${}_6\text{C}$) atom are considered from nonmetals although the outermost energy level of a hydrogen atom contains 1 electron and that of a carbon atom contains 4 electrons.



G.R. Both a sodium ion and an oxygen ion have the same number of electrons.

Because the sodium ion is formed when a sodium atom loses one electron and changes into (Na^+) which contains 10 electrons, while an oxygen ion is formed when an oxygen atom gains two electrons and changes into (O^{2-}) which contains 10 electrons too

➡ From the previous explanation, we can define the ion as follows :

The ion

It is the atom of an element that loses or gains an electron or more during the chemical reaction.

NB

When an atom changes into an ion, the mass number remains as the same without change, while the number of electrons changes.

► **Enrichment information**

- A positive ion diameter is smaller than its atomic diameter.
- A negative ion diameter is bigger than its atomic diameter.

Explanation

- When an atom loses an electron or more, its diameter decreases, and consequently its volume decreases due to lack of electrons rather than protons, and the attraction of nucleus to the remaining electrons increases.
- When an atom gains an electron or more, its diameter increases and consequently its volume increases due to the increase in the number of electrons rather than protons and the occurrence of repelling.



➡ **Comparison between the atom and the ion :**

The atom

1. It is **electrically neutral** in its ordinary state.
2. The number of electrons **equals** the number of protons.
3. Its outermost energy level is **not completely filled** with electrons except atoms of noble gases.



The ion

1. It is **positive or negative** electric charge .
2. The number of electrons is **more or less** than the number of protons.
3. Its outermost energy level is **completely filled** with electrons.

Comparison between metals and nonmetals :

P.O.C.	Metals	Nonmetals
1. Physical state :	They are solids except mercury (Hg) which is a [liquid].	They are solids and gases except bromine (Br) which is a [liquid]
2. Metallic luster :	They have metallic luster .	They have no luster .
3. Malleable & ductile :	They are malleable and ductile	They are not malleable or ductile .
4. Heat & electric conduction :	They are good conductors of heat and electricity.	They are bad conductors of heat and electricity [except graphite which is a good conductor of electricity].
5. No. of electrons in outer shell :	They have less than (4) electrons in the outermost energy level.	They have more than (4) electrons in the outermost energy level.
6. Behaviour of atoms during the chemical reaction :	During the chemical reaction, their atoms tend to lose an electron or more and change into positive ions.	During the chemical reaction, their atoms tend to gain an electron or more and change into negative ions.

Comparison between a positive ion and a negative ion :

Positive ion 	Negative ion 
1. It is an atom of a metallic element that loses an electron or more during the chemical reaction	1. It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.
2. It carries a number of positive charges equals to the number of the lost electrons.	2. It carries a number of negative charges equals to the number of the gained electrons.
3. The number of its electrons is less than the number of protons.	3. The number of its electrons is more than the number of protons.
4. The number of its energy levels is less than that of its atom	4. The number of its energy levels is equal to that of its atom.



THIRD

Noble (inert) gases

They are elements in which the outermost electron shells are completely filled with 8 electrons (except helium which has 2 electrons in its outermost electron shell).

Therefore :

- They don't participate in any chemical reaction in ordinary conditions.
- Their molecules consist of one single atom (monoatomic)
- They don't form positive or negative ions in the ordinary conditions.

Helium ${}^2\text{He}$ Neon ${}^{10}\text{Ne}$ Argon ${}^{18}\text{Ar}$ Krypton ${}^{36}\text{Kr}$ Xenon ${}^{54}\text{Xe}$ Radon ${}^{86}\text{Rn}$







So, we can define noble gases as follows :

Noble (inert) gases

They are elements which don't participate in any chemical reaction in ordinary conditions due to the completeness of their outermost energy levels with electrons

G.R. Noble gases don't participate in chemical reactions under the ordinary conditions.
Due to the completeness of their outermost energy levels with electrons.

➡ The following table shows the atomic structure and the electronic configuration of some atoms of noble gases :

The atom of the Inert gas	Electronic configuration	No. of electrons in the outermost shell
		2
		8
		8

Exercise 2

Which of the following figures represents (Give a reason for your answer) :

1. An atom of a metallic element.
2. An atom of a nonmetallic element
3. A noble gas.
4. A positive ion.
5. A negative ion.

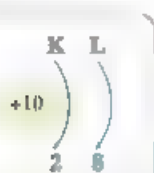


Fig. (A)

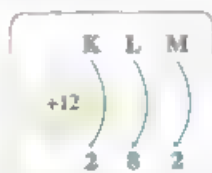


Fig. (B)

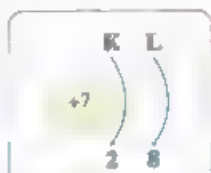


Fig. (C)

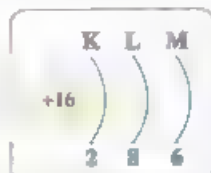


Fig. (D)

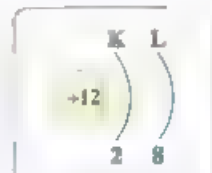


Fig. (E)

Answer

- 1 Fig (B), because it contains 2 electrons in the outermost energy level and the No. of protons equals to the No. of electrons.
- 2 Fig (D), because it contains 6 electrons in the outermost energy level and the No. of protons equals to the No. of electrons.
- 3 Fig (A), due to the completeness of its outermost energy level with 8 electrons and the No. of protons equals to the No. of electrons.
- 4 Fig (E), because the No. of protons is more than the No. of electrons
- 5 Fig. (C), because the No. of protons is less than the No. of electrons

Question

Complete the following table :

Element	Its electronic configuration			Its type	Type of ion	Electronic configuration of the ion		
	K	L	M			K	L	M
${}^7\text{N}$
${}^{11}\text{Na}$
${}^{13}\text{Al}$
${}^8\text{O}$
${}^{17}\text{Cl}$
${}^{18}\text{Ar}$

TRY to answer worksheet in the Notebook

1



Chemical bonds

Atoms combine with each other forming molecules through "Chemical bonds"

We will study two types of bonds, which are :

First
Ionic bond

Second
Covalent bond

FIRST

It is a type of chemical bonds that is formed as a result of combination between a positive ion for an atom of a metallic element and a negative ion for an atom of a nonmetallic element to form a molecule of an ionic compound.

How is an ionic bond formed ?

Combination between

Metallic element

with

Nonmetallic element

- A metal atom loses the outermost electron(s) and changes into a positive ion.



- A nonmetal atom gains the electron(s) lost from a metal atom and changes into a negative ion.



A strong electrical (electrostatic) attraction between positive and negative ions occurs due to their difference in electric charge resulting in the ionic bond.



So, the ionic bond is defined as :

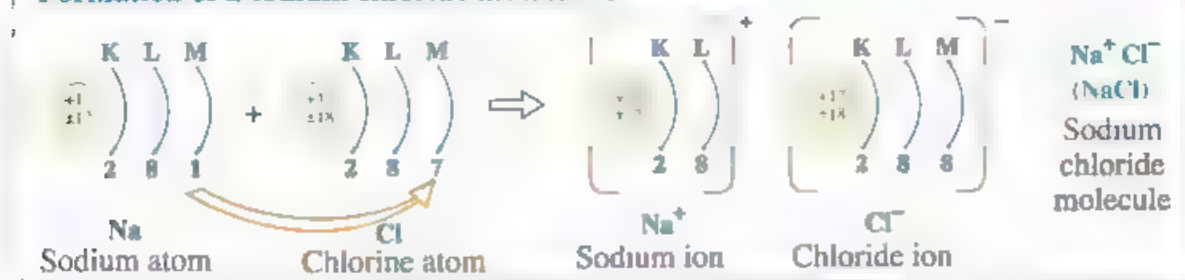
– Ionic bond

It is a chemical bond resulted from the electric attraction between a positive ion and a negative ion.

Examples :

Ex. 1 Formation of a sodium chloride (table salt) molecule [NaCl] :

Formation of a sodium chloride molecule :



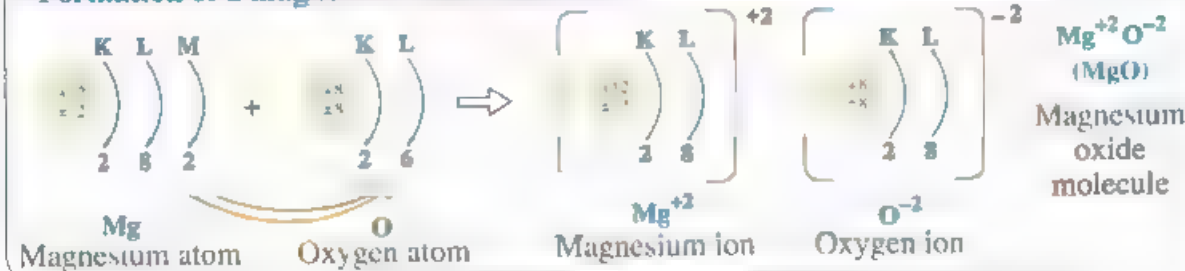
➤ A sodium (**metal**) atom ($^{23}_{11}\text{Na}$) loses one electron and changes into a positive ion (Na⁺).

➤ A chlorine (**nonmetal**) atom ($^{35}_{17}\text{Cl}$) gains one electron (which is lost by a sodium atom) and changes into a negative ion (Cl⁻).

➤ A strong ionic bond is formed due to the electric attraction between a positive sodium ion (Na⁺) and a negative chloride ion (Cl⁻) forming an ionic molecule of sodium chloride (NaCl).

Ex. 2 Formation of a magnesium oxide molecule [MgO] :

Formation of a magnesium oxide molecule :



➤ A magnesium (**metal**) atom ($^{24}_{12}\text{Mg}$) loses 2 electrons and changes into a positive ion (Mg²⁺).

➤ An oxygen (**nonmetal**) atom ($^{16}_8\text{O}$) gains 2 electrons (which are lost by magnesium atom) and changes into a negative ion (O²⁻).

➤ A strong ionic bond is formed due to the electric attraction between a positive magnesium ion (Mg²⁺) and a negative oxygen ion (O²⁻) forming an ionic molecule of magnesium oxide (MgO).



From the previous explanation, we conclude that :

The ionic bond can't be originated between :

- Two atoms of a metal element (similar atoms) **because** each of them forms a positive ion.
- Two atoms of a nonmetal element (similar atoms) **because** each of them forms a negative ion.

G.R.

• **Ionic bond produces compounds molecules only and doesn't produce elements molecules.**

Because ionic bond arises between two different atoms as a result of the electric attraction between a positive ion for an atom of a metallic element and a negative ion for an atom of a nonmetallic element.

• **It is impossible to combine sodium and magnesium together to form a compound.**

Because each of them is a metal and its atom tends to lose the outermost electrons during chemical reactions.

SECOND Covalent bond

Covalent bond often occurs between nonmetal atoms to form elements molecules or compounds molecules.

How is a covalent bond formed?

- ☞ When two nonmetal atoms are interacting with each other, no one of them loses or even gains any electrons.

But, each atom **shares** the other with a number of electrons (from its outermost shell) **equals to** the number of electrons it needs to complete its outermost shell.

- An interference occurred between both atoms, resulting in bond known as a covalent bond.

So, the covalent bond is defined as :

Covalent bond_____

It is a chemical bond originated between the atoms of nonmetals through sharing (participation) of each atom with a number of electrons to complete the outer electron shell of each atom.

Types of covalent bonds

1
Single
covalent bond.

2
Double
covalent bond.

3
Triple
covalent bond.

1 Single covalent bond

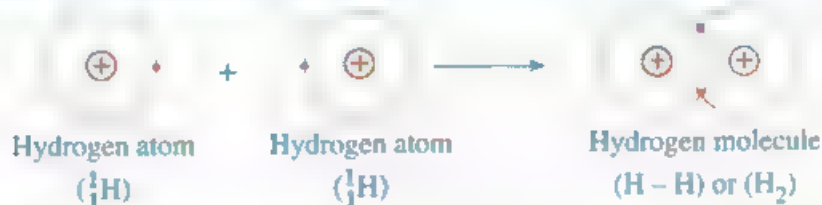
Single covalent bond

It is a chemical bond which arises between two nonmetal atoms by sharing of one pair of electrons, where each atom shares the other atom with one electron

- It is represented by one line (–) joining the two atoms.

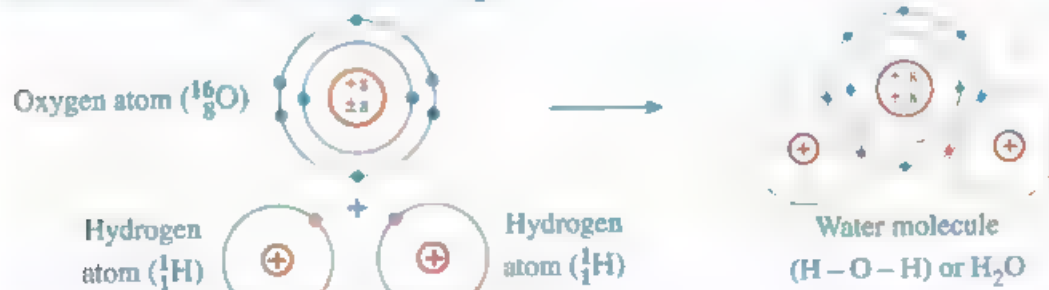
➤ **Examples :**

1 Single covalent bond between two atoms for one element.

**Formation of a hydrogen molecule (H_2) :**

➤ Each hydrogen atom **shares** with one **electron** to complete its **outermost shell** with **two electrons** and becomes more stable.

2 Single covalent bond between one atom for one element and two atoms for another element.

**Formation of a water molecule (H_2O) :**

➤ An oxygen atom **shares** with **two electrons**, while each hydrogen atom **shares** with **one electron** to complete its **outermost shell**.



2 Double covalent bond

Double covalent bond

It is a chemical bond which arises between two nonmetal atoms by sharing of two pairs of electrons, where each atom shares the other atom with two electrons.

- It is represented by two lines (=) joining the two atoms.

⇒ **Example :**

Formation of an oxygen molecule (O_2) :



⇒ Each oxygen atom shares with **two electrons** to complete its **outermost shell** with **8 electrons** and becomes more stable.

3 Triple covalent bond

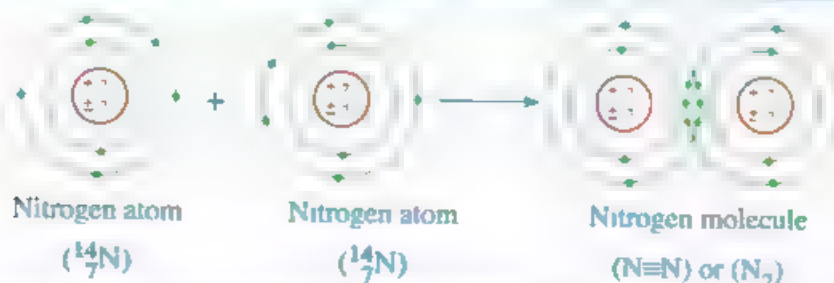
Triple covalent bond

It is a chemical bond which arises between two nonmetal atoms by sharing of three pairs of electrons, where each atom shares the other atom with three electrons.

- It is represented by **three lines** (≡) joining the two atoms.

⇒ **Example :**

Formation of a nitrogen molecule (N_2) :



⇒ Each nitrogen atom shares with **three electrons** to complete its **outermost shell** with **8 electrons** and becomes more stable.

G.R.

- **The covalent bond produces elements molecules.**

Because it arises between two atoms for one nonmetallic element.

- **The covalent bond produces compounds molecules.**

Because it arises between two atoms for two different nonmetallic elements.

- **When an atom of chlorine ($_{17}\text{Cl}$) is combined with an atom of sodium ($_{11}\text{Na}$), the product will be an ionic compound, but when two atoms of chlorine are combined together, the product will be a covalent molecule.**

Because chlorine atom (nonmetal) gains the electron, which is lost by the sodium atom (metal), so an electric attraction occurs between the positive sodium ion and the negative chloride ion, while each of the two chlorine atoms shares with one electron to complete its outermost shell.

► **Enrichment information**

- A covalent bond may occurs among various atoms of nonmetal elements such as a covalent bond in hydrogen chloride HCl [$\text{H} - \text{Cl}$].
- The Egyptian scientist Ahmed Zewail has been granted the Nobel prize in chemistry 1999 in favour of his appreciated role in inventing new brands of cameras working via laser technologies.

➡ **Comparison between an ionic bond and a covalent bond :**

Ionic bond	Covalent bond
1 It arises between metal and nonmetal elements.	1 It arises between two nonmetal elements
2 It is formed by losing and gaining of electrons.	2 It is formed by sharing of one pair of electrons or more.
3 It is formed between two atoms of two different elements.	3 It may be formed between two atoms of the same or different elements.
4 It is formed due to the electrical attraction between the positive and negative ions.	4 It is formed due to sharing of electrons between the atoms
5 It has one type	5. It has three types (single, double and triple).
6. It produces compounds molecules only.	6. It produces elements and compounds molecules.

TRY to answer
worksheet
in the Notebook

2

Remember



Lesson One

- ★ The number of the well known elements up till now is **118 elements**
- ★ Elements can be classified according to their properties and electronic structure into :
 - Metals** : They are elements which have less than four electrons in the outermost shell and have luster, they are good conductors of heat and electricity, malleable and ductile
 - Nonmetals** : They are elements which have more than four electrons in the outermost shell and have no luster, they are bad conductors of heat and electricity (except graphite is good conductor of electricity), not malleable or ductile.
 - Noble (inert) gases** : They are elements which don't participate in any chemical reaction in ordinary conditions due to the completeness of their outermost energy levels with electrons.
- ★ **Ion** : It is the atom of an element which loses or gains an electron or more during the chemical reaction.
- ★ **Positive ion** : It is an atom of a metallic element that loses an electron or more during the chemical reaction.
- ★ **Negative ion** : It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.

Chemical bonds

Ionic bond

It is a chemical bond resulting from the electric attraction between a positive ion and a negative ion.
[Ex.: NaCl & MgO]

Covalent bond

It is a chemical bond originated between the atoms of nonmetals through sharing of each atom with a number of electrons to complete the outer electron shell of each atom.

Types of covalent bonds

Single covalent bond (-)

It is a chemical bond which arises between two nonmetal atoms by sharing of one pair of electrons, where each atom shares with one electron. [Ex.: H_2 & H_2O]

Double covalent bond (=)

It is a chemical bond which arises between two nonmetal atoms by sharing of two pairs of electrons, where each atom shares with two electrons. [Ex.: O_2]

Triple covalent bond (≡)

It is a chemical bond which arises between two nonmetal atoms by sharing of three pairs of electrons, where each atom shares with three electrons. [Ex.: N_2]

Questions ?

on lesson One

● Remember ● Understand ● Apply ● Higher skills ● School book questions.



Interactive
Exercises

1. Choose the correct answer :

1. The number of known elements up till now is elements.
a. 92 b. 118 c. 121 d. 211
2. All of these elements are metal solid elements, except
a. sodium. b. magnesium. c. mercury. d. aluminium.
3. All of the following are properties of metals, except
a. they are malleable and ductile.
b. they are good conductors of electricity.
c. they contain 1, 2 or 3 electrons in outermost shell.
d. they are bad conductors of heat.
4. All of the following are metals, except
a. iron. b. oxygen. c. copper. d. sodium.
5. Oxygen is from
a. acids. b. bases. c. metal elements. d. nonmetal elements.
6. The element which has atomic number 12 is considered from
a. metals. b. nonmetals. c. noble gases. d. no correct answer.
7. When an atom of an element loses one electron or more, it changes into
a. a negative ion. b. a positive ion c. a neutral atom. d. no correct answer.
8. All of the following elements can form positive ions, except
a. sodium ($_{11}\text{Na}$). b. chlorine ($_{17}\text{Cl}$).
c. magnesium ($_{12}\text{Mg}$). d. aluminium ($_{13}\text{Al}$).
9. Which of the following figures represents the structure of sodium ion ? Fig. (.....).

a

b

c

d
10. The number of energy levels in sodium ion is the number of energy levels in its atom.
a. less than b. more than c. equal to d. no correct answer



11. When an atom is changed into an ion, the is changed.
 - a. number of protons
 - b. number of neutrons
 - c. number of electrons
 - d. mass number
12. A lithium atom (Li) changes into a lithium ion (Li^+), which means that it
 - a. gains one proton.
 - b. gains one electron.
 - c. loses one proton.
 - d. loses one electron.
13. During the chemical reaction, a magnesium atom (${}_{12}\text{Mg}$) loses its outer electrons and changes into .
 - a. Mg^+
 - b. Mg^-
 - c. Mg^{+2}
 - d. Mg^{-2}
14. The only nonmetal that exists in a liquid state is
 - a. bromine.
 - b. chlorine.
 - c. hydrogen.
 - d. nitrogen.
15. All of nonmetals don't conduct electricity, except
 - a. bromine.
 - b. aluminium.
 - c. graphite.
 - d. mercury.
16. In a negative ion, the number of protons is the number of electrons.
 - a. less than
 - b. more than
 - c. equal to
 - d. no correct answer
17. All of these elements can form negative ions, except ..
 - a. oxygen (${}_8\text{O}$)
 - b. nitrogen (${}_7\text{N}$)
 - c. chlorine (${}_{17}\text{Cl}$)
 - d. aluminium (${}_{13}\text{Al}$).
18. When a nitrogen atom (${}^{14}_7\text{N}$) gains electrons to complete its outer shell, it becomes
 - a. N^{+3}
 - b. N^{-2}
 - c. N^{-3}
 - d. N^-
19. The number of electrons in oxygen ion (O^{2-}) is electrons.
 - a. 6
 - b. 8
 - c. 10
 - d. 12

20. Which of the following figures represents the chloride ion (Cl^-) ? Fig. ()



21. The number of determines the type of element and its chemical activity.
 - a. electrons in the outermost energy level
 - b. levels filled with electrons
 - c. neutrons
 - d. protons
22. All the following are properties of inert gases, except
 - a. they don't participate in chemical reactions.
 - b. their outermost electron shells are completely filled.
 - c. they form negative ions.
 - d. their molecules consist of one single atom.

23. All of these elements can participate in chemical reactions, except
 a sodium ($_{11}\text{Na}$) b neon ($_{10}\text{Ne}$) c hydrogen ($_1\text{H}$) d nitrogen ($_7\text{N}$).
24. The molecule of a noble gas consists of
 a. two different atoms. b. one atom.
 c. two similar atoms. d. one or two similar atoms.
25. During the formation of a sodium chloride molecule, sodium atom
 a. gains one electron from chlorine atom.
 b. gives one electron to chlorine atom.
 c. gains two electrons from chlorine atom.
 d. gives two electrons to chlorine atom.
26. During the formation of a magnesium oxide molecule, oxygen atom changes into
 a. positive ion and carries one positive charge.
 b. negative ion and carries one negative charge.
 c. positive ion and carries two positive charges.
 d. negative ion and carries two negative charges.
27. The bond in a sodium chloride molecule is bond.
 a single covalent b double covalent c triple covalent d ionic
28. The covalent bond usually arises between elements.
 a. two metallic b. two nonmetallic
 c. metallic and nonmetallic d. metallic and noble
29. All of the following are examples of single covalent bonds, except
 a. H_2 b. HCl c. N_2 d. H_2O
30. Which of the following figures represents the molecule of water ? Fig. ()



31. All of the following are covalent molecules, except
 a. H_2O b. MgO c. HCl d. O_2
32. The covalent bond in an oxygen molecule is a bond.
 a. single b. double c. triple d. no correct answer
33. There is a triple covalent bond in molecule.
 a. hydrogen b. chlorine c. oxygen d. nitrogen



2. Put (✓) or (x) in front of the following statements and correct the wrong ones :

1. All metals are solids except mercury which is a liquid. ()
2. Metals tend to lose electrons and convert into negative ions ()
3. Sodium, magnesium and aluminium can form positive ions ()
4. In a positive ion, the number of electrons is greater than the number of protons. ()
5. Nonmetals have more than four electrons in their outer shells. ()
6. Metals are malleable and ductile, while nonmetals are not. ()
7. The outermost energy level of sodium ion (Na^+) has one electron ()
8. Graphite is the only nonmetal that conducts electricity. ()
9. The molecules of noble gases are diatomic molecules. ()
10. Ionic bond arises between two nonmetals. ()
11. The bond in sodium chloride is a single covalent bond ()
12. During the formation of a magnesium oxide molecule, a magnesium atom gains two electrons from oxygen atom. ()
13. Magnesium oxide is an ionic compound. ()
14. In an ionic bond, the metal atom gives electrons to the nonmetal atom. ()
15. The bond in a hydrogen molecule is a double covalent bond ()
16. Each atom in an oxygen molecule shares by two electrons. ()
17. The bond in a nitrogen molecule is a triple covalent bond. ()
18. In a covalent bond, the two nonmetal atoms do not lose or gain electrons. ()
19. The bond in water molecule is an ionic bond. ()

3. Write the scientific term of each of the following :

1. Elements have luster, good conductors of heat and electricity and they contain less than (4) electrons in their outer electron shells.
2. The only metal that exists in a liquid state.
3. Elements that may be solids, liquids or gases and having no luster, bad conductors of heat and electricity and containing more than (4) electrons in their outer electron shells
4. The only nonmetal that exists in a liquid state.
5. The only nonmetal that conducts electricity.
6. An atom that has lost an electron or more during the chemical reaction.
7. An atom gained one electron or more during the chemical reaction.
8. An atom of an element that gives or gains an electron or more during the chemical reaction
9. An atom of an element that neither loses nor gains any electrons.
10. Elements whose outermost shells are completely filled with electrons

- 11. A bond resulting from the electric attraction between a positive ion and a negative ion
- 12. • The bond that is formed between magnesium and oxygen atoms.
 - The chemical bond originated between two elements have atomic numbers 11 and 17.
- 13. A bond that is formed between two nonmetals with sharing of electrons.
- 14. A bond arises between two hydrogen atoms, where each atom shares with one electron
- 15. A bond that is resulted from the sharing of each atom with two electrons
- 16. • A bond that is formed between two nonmetals through sharing of each atom by three electrons.
 - A bond resulting from the participation of each of the two atoms with three electrons.

4. Complete the following statements :

- 1. The number of known elements up till now is elements.
- 2. Elements are classified according to their properties and electronic structure into ... ,
... and ...
- 3. Metals have less than ... electrons in their outermost shell.
- 4. All metals are ... except ... which is a liquid.
- 5. ... elements are good conductors of heat and electricity.
- 6. Atoms of ... tend to lose an electron or more during the chemical reaction and
change into ... ions.
- 7. ... and ... atoms are examples of metal atoms.
- 8. During the chemical reaction, a sodium atom ($^{23}_{11}\text{Na}$) ... one electron and changes into
... ion.
- 9. The number of electrons in the outermost shell of a magnesium ($^{24}_{12}\text{Mg}$) atom is ... ,
while that of a magnesium ion is ...
- 10. Nonmetals have ... than 4 electrons in their outermost shell.
- 11. Some nonmetals are gases as and others are solids as
- 12. All nonmetals are conductors of electricity except ... which is ...
conductor of electricity.
- 13. Elements of have luster, while elements of ... do not have luster.
- 14. Elements of ... are malleable and ductile, while elements of are not malleable
or ductile.
- 15. is the only liquid metallic element, while ... is the only liquid nonmetallic
element.
- 16. A nitrogen atom contains ... electrons, while a nitrogen ion contains ... electrons.
- 17. The symbol of an oxygen ion is ... , while that of a sodium ion is ...
- 18. The number of energy levels in an atom of ... element is equal to the number of
energy levels in its ion, while the number of energy levels in an atom of ... element
is more than the number of energy levels in its ion.
- 19. An atom of ... doesn't lose or gain any electrons under ordinary conditions.



- 20. _____ elements do not participate in chemical reactions in ordinary conditions as the outer shell is filled with _____.
- 21. An ionic bond arises between _____ and _____ elements.
- 22. An ionic bond resulted from the electric attraction between _____ and _____.
- 23. During the formation of sodium chloride, ($_{17}\text{Cl}$) atom _____ one electron and changes into _____ ion.
- 24. During the formation of (MgO) molecule, _____ atom loses _____ electrons which are gained by _____ atom.
- 25. _____ and _____ are examples of ionic compounds.
- 26. Covalent bonds are formed between two _____ elements.
- 27. In _____ bond, the atoms don't lose or gain any electrons.
- 28. The chemical bond in a magnesium oxide molecule is _____ bond, while the bond in oxygen molecule is _____ bond.
- 29. The bond in sodium chloride molecule is _____ bond, whereas the bonds in water molecule are _____ bonds.
- 30. An oxygen atom _____ two electrons during the formation of a magnesium oxide molecule, while it _____ two electrons during the formation of an oxygen molecule.
- 31. The types of covalent bonds are _____, _____ and _____.
- 32. The bond in a hydrogen molecule is a _____ bond, while the bond in a nitrogen molecule is a _____ bond.

5. Complete the following tables :

Element	Electronic configuration				No. of protons	Its type	No. of electrons in ion	Type of ion	Symbol of its ion
	K	L	M	N					
1. $_{12}\text{Mg}$
2. $_{15}\text{P}$
3. $_{18}\text{Ar}$
4. $_{17}\text{Cl}$
5. $_{19}\text{K}$

B

Atom	Electronic configuration			Molecule	Type of bond
	K	L	M		
1. $_{11}\text{Na}$	NaCl	.....
$_{17}\text{Cl}$		
2. $_{12}\text{Mg}$	MgO	.....
$_8\text{O}$		
3. $_7\text{N}$	N_2	.....
4. $_8\text{O}$..		O_2	.....

6. Complete the following figures and write the type of the bond :



7. Give reasons for :

- The number of electrons of an ion differs from that of its atom
- When an atom loses an electron or more, it becomes a positive ion
- When an atom gains an electron or more, it becomes a negative ion.
- The number of energy levels in the ion of a metallic element is less than the number of energy levels in its atom.
- A sodium atom ($_{11}\text{Na}$) tends to form a positive ion, while oxygen atom ($_8\text{O}$) tends to form a negative ion.
- Noble gases don't participate in chemical reactions under the ordinary conditions.
- Both sodium ion and oxygen ion have the same number of electrons.
- The bond in a molecule of magnesium oxide (MgO) is an ionic bond [regarding that the atomic number for magnesium (Mg) = 12 and oxygen (O) = 8].



9. It is impossible to combine sodium and magnesium together to form a compound
10. Ionic bonds produce compounds only not elements, but the covalent bonds may produce both types an element or even a compound.
11. When an atom of chlorine ($_{17}\text{Cl}$) is joined with an atom of sodium ($_{11}\text{Na}$), the product will be an ionic compound, but when two atoms of chlorine are joined together, the product will be a covalent molecule.
12. The bond in a hydrogen (H_2) molecule is a single covalent bond
13. The bond in an oxygen (O_2) molecule is a double covalent bond
14. The bond in a water (H_2O) molecule is a single covalent bond.
15. The bond in a nitrogen (N_2) molecule is a triple covalent bond.

8. What is meant by ... ?

- | | | |
|---------------------------|-------------------|---------------------------|
| 1. Metals. | 2. Nonmetals. | 3. $+$ Positive ion. |
| 4. $-$ Negative ion. | 5. $-$ The ion. | 6. Noble (inert) gases. |
| 7. Ionic bond. | 8. Covalent bond. | 9. Single covalent bond. |
| 10. Double covalent bond. | | 11. Triple covalent bond. |

9. What happens when ... ?

1. You hammer a piece of carbon and why ?
2. An atom loses one electron or more.
3. An atom gains one electron or more.
4. An oxygen atom combines with a magnesium atom.
5. A chlorine atom combines with a hydrogen atom.
6. Two oxygen atoms combine together.

10. Choose the odd word (or symbol) out, then mention the scientific name of the rest :

1. Magnesium / Sodium / Mercury / Aluminium.
2. $_{17}\text{Cl}$ / $_{20}\text{Ca}$ / $_{19}\text{K}$ / $_{11}\text{Na}$
3. $_{12}\text{Mg}$ / $_{11}\text{Na}$ / $_{4}\text{Be}$ / $_{20}\text{Ca}$
4. Hydrogen / Oxygen / Nitrogen / Graphite.
5. Oxygen / Nitrogen / Chlorine / Sodium.
6. $_{9}\text{F}$ / $_{16}\text{S}$ / $_{5}\text{B}$ / $_{15}\text{P}$
7. $_{2}\text{He}$ / $_{18}\text{Ar}$ / $_{11}\text{Na}$ / $_{10}\text{Ne}$
8. Nitrogen molecule / Table salt molecule / Hydrogen molecule / Oxygen molecule.

11. Write down the electronic configuration of the atoms of the following elements :



Then indicate :

1. The type of each atom (Metal – Nonmetal – Noble).
2. The type of each ion (Positive – Negative – Has no ions).

12. Write the electronic configuration of each of the following atoms :



Then indicate :

1. The type of each element (Metal – Nonmetal – Noble gas)
2. The type of ion for each of them (Positive – Negative – No ions).
3. How the bond is formed between :
 - a) Two hydrogen atoms.
 - b) Two nitrogen atoms.
4. The element that has no ability to form a bond is (Complete).

13. Compare between :

1. An atom and an ion.
2. Metals and nonmetals.
3. Mercury and bromine [According to Type of element – Physical state – Luster].
4. Aluminium and graphite [According to . Electric conduction – Heat conduction – Ability to malleable and ductile].
5. Positive ion and negative ion.
6. Ionic bond and covalent bond.
7. Single, double and triple covalent bonds.

14. Mention one difference between :

1. Graphite and oxygen.
2. (Na) and (Na⁺).
3. (O₂) and (2O).

15. Mention the properties of :

1. Metals.
2. Nonmetals.

16. You see one of the iron smiths hitting a rod of iron without being broken, but if somebody hits a piece of coal, it will be easily broken into pieces. How do you explain ?



17. Draw a diagram showing the electronic configuration of the atom of oxygen ($^{16}_8\text{O}$), then show how two of its atoms are bonded to form oxygen molecule (O_2).

18. Show by drawing the combination between each of the following and mention the type of bond.

1. Hydrogen (${}_1\text{H}$) and oxygen (${}_8\text{O}$) to form water molecule.
2. Magnesium (${}_{12}\text{Mg}$) and oxygen (${}_8\text{O}$) to form magnesium oxide molecule
3. Oxygen (${}_8\text{O}$) and calcium (${}_{20}\text{Ca}$) to form calcium oxide molecule.
4. Sodium atom (${}_{11}\text{Na}$) and chlorine atom (${}_{17}\text{Cl}$) to form sodium chloride molecule.
5. Two hydrogen atoms (${}_1\text{H}$) to form hydrogen molecule.
6. Two nitrogen atoms (${}_7\text{N}$) to form nitrogen molecule.

19. The following figures represent some atoms. Answer the following questions :



Fig. (a)

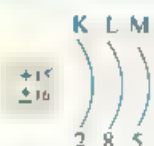


Fig. (b)



Fig. (c)



Fig. (d)

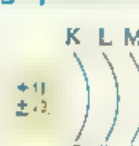


Fig. (e)

1. Find the type of element and ion if it is present of each of them.
2. Find the No. of electrons which lost or gained during the chemical reactions in each of them.
3. Which of these atoms is a good conductor of heat and electricity.

20. The following figures represent three molecules, whose atoms combine together by covalent bonds.



Fig. (a)



Fig. (b)



Fig. (c)

• Which of these figures represents :

1. Hydrogen molecule.
2. Oxygen molecule.
3. Nitrogen molecule.

21. Two elements (X and Y) have atomic numbers (11 and 17) respectively :

1. Show by drawing how the chemical bond is formed between them.
2. What is the type of this bond ?

Thinking Skills

Questions

1. Choose the correct answer :

- The cables of electric wires are made up of an element, whose atomic number is
a. 10 b. 7 c. 13 d. 17
- From the opposite two figures :
The charge of each of the two ions is
a. -2 b. -1
c. +1 d. +2
- The number of electrons in the outermost energy level of oxygen ion equals the number of electrons in the outermost energy level of
a. $(^{40}_{20}\text{Ca})$ ion. b. $(^{14}_7\text{N})$ atom c. $(^{35}_{17}\text{Cl})$ atom. d. $(^{32}_{16}\text{S})$ atom
- The electronic configuration of potassium ($_{19}\text{K}$) ion is similar to the electronic configuration of ion.
a. $_8\text{O}$ b. $_{11}\text{Na}$ c. $_{18}\text{Ar}$ d. $_{17}\text{Cl}$
- The element, whose atomic number is forms an ionic bond with oxygen.
a. 2 b. 10 c. 12 d. 16
- Nonmetal element its nucleus contains 18 neutrons, its electrons revolve in 3 energy levels and it tends to gain one electron during chemical reactions, its mass No. equal
a. 17 b. 18 c. 35 d. 40



2. The following figures represent the electronic configuration of the outermost energy level of four atoms of elements, whose electrons revolve in three energy levels.



Element
(S)



Element
(R)



Element
(Q)



Element
(P)

Answer the following questions :

- What are the elements which are considered from metals ?
- What is the element which forms an ion from the type (M^{+3}) ?
- What is the type of the ion which the element (R) forms ? (Give a reason)
- What is the element, whose nucleus contains 11 protons ? (Give a reason).

**3. Give reasons for :**

1. Jewellery is made up of some metallic elements.
2. Some metals are used in manufacturing some cooking pots.

4. "A , B , C and D" are four elements, whose atomic numbers are "1 , 11 , 10 and 17 " respectively.

1. Classify them into metal, nonmetal and noble gas.
2. Show by drawing how two atoms of (A) form a covalent bond.
3. What is the type of bond when (B) combines with (D) ?
4. What is the type of bond when two atoms of (D) combine together ?
- 5 Explain why element (C) doesn't undergo chemical reaction under normal conditions ?

5. Two elements (${}_8\text{A}$) & (${}_{12}\text{B}$) :

1. Which one is a metal and which one is a nonmetal ?
- 2 What is the kind of bond formed between the two atoms of (A) ? Show by drawing.
- 3 Show by drawing the bond formed between (A) and (B) elements and mention the name of the formed compound.

6. Show the electronic configuration of the following atoms, then mention the atomic number and the type of element for each one .

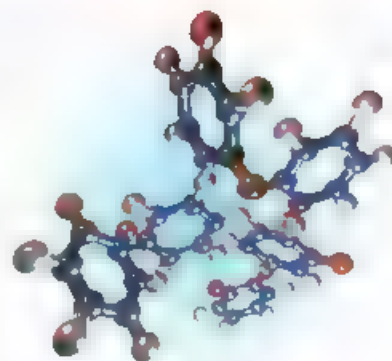
1. An element atom that gains two electrons in the outermost energy level (L) during the chemical reaction
2. An element atom whose electrons distribute in 4 energy levels and its ion carries one positive charge.
3. An element atom whose electrons distribute in 3 energy levels and the symbol of its ion is (X^{-3}).
4. An element atom loses two electrons during the chemical reaction, so (M) level becomes the outermost energy level of its ion.

Chemical Compounds



What is meant by valency ?

- The atoms of noble elements are the most stable atoms due to the completeness of their outermost energy level with electrons.
- The atoms of other elements tend to enter in chemical reactions to reach the stable state to become their outermost energy levels completed with electrons by :
 - Losing the outermost electrons as in **metals**,
 - Gaining or sharing with electrons as in **nonmetals**,
- This number of electrons is known as "Valency"



Valency



It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

G.R. *The valency of noble gases is zero.*



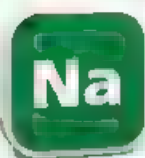

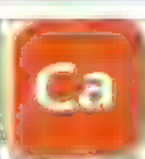



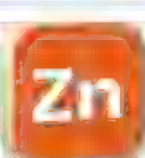
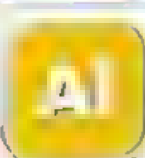
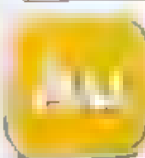
Because their outermost energy level is completely filled with electrons [have 8 electrons except (He) has 2 electrons], so they don't gain, lose or even share electrons



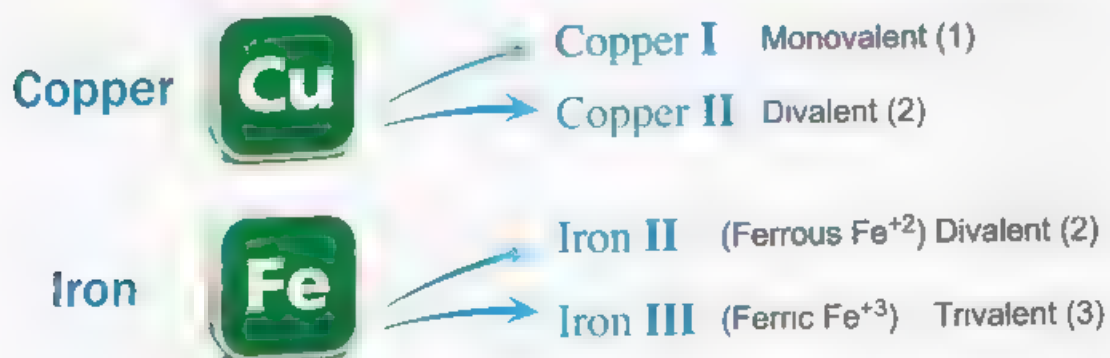
- The valency of an element is determined according to the number of electrons in the outermost energy level of its atom as in the following table :

Element	Electronic configuration			Valency
	K	L	M	
	2	8	(1)	Monovalent (1) G.R. Because it <i>loses</i> one electron during the chemical reaction.
	2	8	(7)	Monovalent (1) G.R. Because it <i>gains or shares</i> with one electron during the chemical reaction.
	2	(6)	—	Divalent (2) G.R. Because it <i>gains or shares</i> with two electrons during the chemical reaction.
	2	8	(2)	Divalent (2) G.R. Because it <i>loses</i> two electrons during the chemical reaction.
	2	8	(3)	Trivalent (3) G.R. Because it <i>loses</i> three electrons during the chemical reaction.
	2	8	(8)	Zero G.R. Because it <i>doesn't</i> lose, gain or share with any electrons, due to the completeness of their outermost energy levels with electrons.

➤ The following table shows the valencies of some metallic elements :

Metallic element				Valency
Lithium		Potassium		Monovalent (1)
Sodium		Silver		
Calcium		Magnesium		Divalent (2)
Lead		Mercury		
Zinc				
Aluminium		Gold		Trivalent (3)

➤ Some metallic elements have more than one valency such as :





➤ The following table shows the valencies of some nonmetallic elements :

Nonmetallic element				Valency
Hydrogen		Chlorine		Monovalent (1)
Fluorine		Bromine		
Iodine				
Oxygen				Divalent (2)
Carbon				Tetravalent (4)

➤ Some nonmetallic elements have more than one valency such as :



The atomic group

The atomic group (Radical)

It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, having its own valency and it isn't existed solely (individually).



The valency of an atomic group equals the number of charges which it carries.

Example : Bicarbonate group (HCO_3^-)

- Its valency is **monovalent**.
- It consists of **5 atoms of 3 elements** :
 - One atom of hydrogen element (H).
 - One atom of carbon element (C).
 - Three atoms of oxygen element (O).



Atomic group isn't
existed individually

➡ The following table shows the valencies of some atomic groups :

Atomic group	Formula	Valency
Hydroxide	$(\text{OH})^-$	Monovalent (1)
Bicarbonate	$(\text{HCO}_3)^-$	
Nitrate	$(\text{NO}_3)^-$	
Nitrite	$(\text{NO}_2)^-$	
Ammonium	$(\text{NH}_4)^+$	
Carbonate	$(\text{CO}_3)^{-2}$	Divalent (2)
Sulphate	$(\text{SO}_4)^{-2}$	
Phosphate	$(\text{PO}_4)^{-3}$	Trivalent (3)



Question



Put (less than – more than or equal to) in the following spaces :

1. The number of atoms forming nitrate group is .. the number of elements forming bicarbonate group.
2. The number of elements forming hydroxide group is the number of its atoms.
- 3 The number of atoms forming carbonate group is the number of atoms forming sulphate group.
4. The number of elements forming phosphate group is the number of atoms forming ammonium group.
5. The number of atoms forming nitrite group is the number of atoms forming nitrate group.

Chemical formula

- Compound molecules are formed as a result of combination of atoms of different elements together.
- We can express a molecule of a chemical compound via a certain formula known as **chemical formula**.

Chemical formula

It is a formula that represents the number and the type of the atoms in a molecule.

Comparison between water molecule and sodium chloride molecule :

P.O.C.	Water molecule	Sodium chloride molecule
Chemical formula :	H_2O	$NaCl$
Illustrating figure :		
No. of elements in molecule :	Two elements : • Hydrogen (H) • Oxygen (O)	Two elements : • Sodium (Na) • Chlorine (Cl)
No. of atoms in molecule :	Three atoms : • Two atoms of hydrogen element (H). • One atom of oxygen element (O).	Two atoms : • One atom of sodium element (Na). • One atom of chlorine element (Cl).

What is meant by ...?

The chemical formula of sodium chloride molecule is (NaCl).

- This means that the molecule of (NaCl) is consists of one atom of sodium element (Na) and one atom of chlorine element (Cl).

How can you write a chemical formula for a compound ?

➤ We follow the following steps :

Steps	Examples		
1 Write the name of the compound in words	Calcium oxide	Magnesium hydroxide	Aluminium oxide
2 Write the symbol of each element or atomic group down to its name.	Ca O	Mg OH	Al O
3 - Write the valency down to each symbol or atomic group. - Exchange the valencies.	2 2	2 1	3 2
4 - Simplify the valencies (shortened as much as possible). - You don't have to write the one (1) - In case of atomic groups if the number is not (1), put the atomic group between brackets and write the number right down to it.	Ca ₂ O ₂ CaO	Mg ₁ (OH) ₂ Mg(OH) ₂	Al ₂ O ₃ Al ₂ O ₃



The formula for a compound

Starts from the left with :

A symbol of metal.

or

Hydrogen.

or

A positive atomic group.

Ends on the right with :

A symbol of nonmetal.

or

A negative atomic group.

- * The word "oxide" means the combination of the **metallic** element or **nonmetallic** element with **oxygen** element.



Exercise 1

Write the chemical formula for each of the following molecules and mention the number of forming elements and the number of atoms in each molecule.

1. Hydrogen chloride.
2. Sodium hydroxide.
3. Magnesium sulphate.
4. Calcium carbonate.
5. Sodium carbonate.
6. Aluminium sulphate.
7. Sodium oxide.
8. Calcium sulphate.
9. Sodium nitrate.
10. Aluminium carbonate.
11. Carbon dioxide.
12. Sodium sulphate.
13. Copper carbonate.

Answer

Compound	Chemical formula	No. of elements forming the molecule	No. of atoms in the molecule
1. Hydrogen chloride	 HCl	2	2
2. Sodium hydroxide	 NaOH	3	3
3. Magnesium sulphate	 MgSO ₄	3	1 + 1 + 4 = 6
4. Calcium carbonate	 CaCO ₃	3	1 + 1 + 3 = 5
5. Sodium carbonate	 Na ₂ CO ₃	3	2 + 1 + 3 = 6

6. Aluminium sulphate	<p>Al SO₄</p> <p>3 2</p> <p>Al₂(SO₄)₃</p>	3	$2 + 3 + 12 = 17$
7. Sodium oxide	<p>Na O</p> <p>1 2</p> <p>Na₂O</p>	2	3
8. Calcium sulphate	<p>Ca SO₄</p> <p>2 2</p> <p>CaSO₄</p>	3	$1 + 1 + 4 = 6$
9. Sodium nitrate	<p>Na NO₃</p> <p>1 1</p> <p>NaNO₃</p>	3	$1 + 1 + 3 = 5$
10. Aluminium carbonate	<p>Al CO₃</p> <p>3 2</p> <p>Al₂(CO₃)₃</p>	3	$2 + 3 + 9 = 14$
11. Carbon dioxide	<p>C O</p> <p>2 2</p> <p>CO₂</p>	2	3
12. Sodium sulphate	<p>Na SO₄</p> <p>1 2</p> <p>Na₂SO₄</p>	3	$2 + 1 + 4 = 7$
13. Copper carbonate	<p>Cu CO₃</p> <p>2 2</p> <p>CuCO₃</p>	3	$1 + 1 + 3 = 5$



G.R. • An oxygen atom joins two atoms of sodium when composing one molecule of sodium oxide (Na_2O).

Because oxygen is divalent, while sodium is monovalent.

• The chemical formula of sodium carbonate is (Na_2CO_3).

Because sodium is monovalent, while carbonate is divalent group.

? Exercise 2

Complete the following table with suitable chemical formulae :

	Silver	Zinc	Iron III
Nitrate	..... (1) .....	..... (2)	$\text{Fe}(\text{NO}_3)_3$
Sulphate	..... (3)	ZnSO_4	(4)
Phosphate	Ag_3PO_4	(5)	(6)

Answer

(1) AgNO_3

(2) $\text{Zn}(\text{NO}_3)_2$

(3) Ag_2SO_4

(4) $\text{Fe}_2(\text{SO}_4)_3$

(5) $\text{Zn}_3(\text{PO}_4)_2$

(6) FePO_4

TRY to answer
worksheet
in the Notebook

3

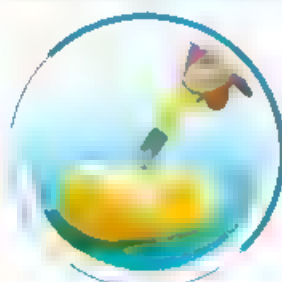
Types of compounds

- In nature, there is a countless number of existing compounds.
- Compounds can be classified according to their properties into

1 Acids



2 Bases (Alkalis)



3 Oxides



4 Salts





Acids



Acids

They are substances (materials) which dissociate in water producing positive hydrogen ions H^+

- The chemical formula for all mineral acids begins with **hydrogen** joined with :

One of the negative atomic groups [except $(OH)^-$ group]

Examples :

- Sulphuric acid (H_2SO_4).
- Nitric acid (HNO_3).

One of nonmetal elements [except oxygen]

Examples :

- Hydrochloric acid (HCl).
- Hydrobromic acid (HBr).

Properties of acids

- 1 They have a sour taste.



Lemon has a sour taste

- 2 They change the colour of **blue** litmus paper into **red**.

Blue litmus paper



HCl acid

Due to : the presence of the **positive hydrogen ions H^+**

Enrichment information

- Acids are classified according to their **strength** [degree of ionization] into
 - **Strong acids** : such as hydrochloric acid (HCl) & nitric acid (HNO_3).
 - **Weak acids** : such as carbonic acid (H_2CO_3).



Bases



Bases

They are substances which dissociate in water producing negative hydroxide ions (OH^-)

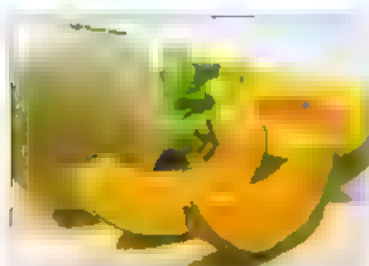
- The chemical formula of all bases (alkalis) ends with OH^- group.

Examples of some bases :

- Sodium hydroxide [caustic soda] (NaOH).
- Potassium hydroxide (KOH).
- Calcium hydroxide [limewater] ($\text{Ca}(\text{OH})_2$).

Properties of bases (alkalis)

- 1 Their aqueous solutions have a bitter taste and feel slippery.



Cantaloupe has a bitter taste

- 2 They change the colour of red litmus paper into blue.



Due to the presence of the negative hydroxide ions (OH^-)

? Exercise 3

If you have two unmarked tubes, one contains an acid and the other contains a base. How can you distinguish between them ?

Answer

By putting two litmus papers (red and blue) in each tube.

- If the colour of the blue litmus paper changes into red, the tube contains the acid.
- If the colour of the red litmus paper changes into blue, the tube contains the base.



Warning

Don't touch acids or even bases with your bare hands as they have corrosive effect on skin.

➔ Comparison between acids and bases :

P.O.C.	Acids	Bases
1. Definition :	They are substances which dissociate in water producing positive hydrogen ions H^+	They are substances which dissociate in water producing negative hydroxide ions $(OH)^-$
2. Symbol :	The symbol of all the mineral acids begins with hydrogen H .	The symbol of all alkalis ends with $(OH)^-$ group .
3. Taste :	They have a sour taste.	They have a bitter taste.
4. The effect on litmus paper :	They change the colour of litmus paper into red due to the presence of the positive hydrogen ions H^+	They change the colour of litmus paper into blue due to the presence of the negative hydroxide ions $(OH)^-$
5. Examples :	H_2SO_4 & HCl	$NaOH$ & $Ca(OH)_2$

Oxides

Oxides

They are compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.

Oxides are classified into

1 Metal oxides

They are formed from the combination of oxygen with a metal.

Examples :

- Sodium oxide (Na_2O).
- Aluminium oxide (Al_2O_3).

2 Nonmetal oxides

They are formed from the combination of oxygen with a nonmetal.

Examples :

- Carbon dioxide (CO_2).
- Sulphur trioxide (SO_3).

Salts

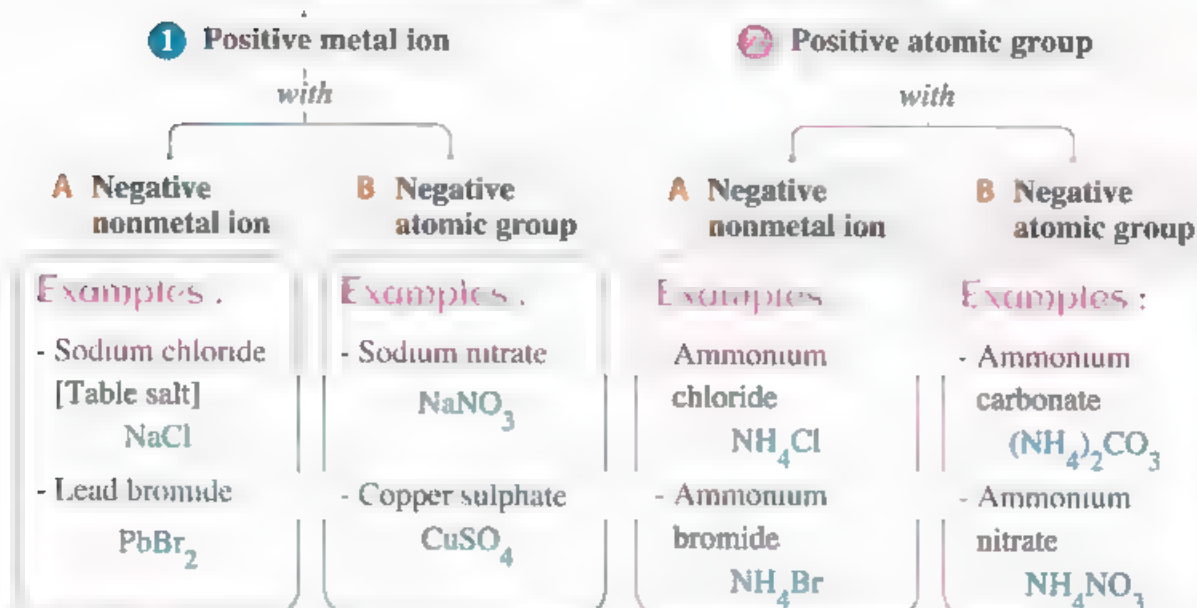
Salts exist within the components of the Earth's crust or dissolved in water of seas and oceans.

Salts

They are compounds resulted from the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).



Salts are produced from the combination of



- All of negative ions form salts except the negative oxygen ion (oxide O^{2-}).
- All of negative atomic groups form salts except the hydroxide group (OH^-).

Properties of salts:

- Salts are variant in some of their properties such as :
 - Taste.
 - Colour.
 - Smell.
 - Solubility in water.
- Salts differ according to the solubility in water into :

A Salts dissolve (soluble) in water

Ex.:

- Sodium chloride (NaCl).
- Potassium sulphate (K_2SO_4)
- Calcium nitrate ($\text{Ca}(\text{NO}_3)_2$)
- Sodium sulphide (Na_2S).



B Salts do not dissolve (insoluble) in water

Ex.:

- Silver chloride (AgCl).
- Lead iodide (PbI_2)
- Lead sulphate (PbSO_4).



All of carbonate salts don't dissolve in water except sodium carbonate, potassium carbonate and ammonium carbonate.

TRY to answer
worksheets
in the Notebook

4 & 5

Remember



Lesson Two

★ **Valency** : It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

★ The following tables show the valencies of some metallic and nonmetallic elements :

Metallic element	Valency	Nonmetallic element	Valency
Lithium (Li)	Monovalent (1)	Hydrogen (H)	Monovalent (1)
Potassium (K)		Chlorine (Cl)	
Sodium (Na)		Fluorine (F)	
Silver (Ag)		Bromine (Br)	
Copper I (Cu)		Iodine (I)	
Calcium (Ca)	Divalent (2)	Sulphur (S)	Divalent (2)
Magnesium (Mg)		Oxygen (O)	
Iron II (Fe)		Nitrogen (N)	Trivalent (3)
Lead (Pb)		Carbon (C)	
Copper II (Cu)		Carbon (C)	Tetravalent (4)
Mercury (Hg)		Nitrogen (N)	
Zinc (Zn)		Phosphorus (P)	Pentavalent (5)
Aluminium (Al)	Trivalent (3)	Sulphur (S)	
Gold (Au)		Chlorine (Cl)	Hexavalent (6)
Iron III (Fe)		Oxygen (O)	

★ **The atomic group** : It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, having its own valency and it isn't existed solely (individually).

★ The following table shows the valencies of some atomic groups :

Atomic group		Valency
Hydroxide (OH) ⁻	Bicarbonate (HCO ₃) ⁻	Monovalent (1)
Nitrate (NO ₃) ⁻	Nitrite (NO ₂) ⁻	
Ammonium (NH ₄) ⁺		
Carbonate (CO ₃) ⁻²		Divalent (2)
Sulphate (SO ₄) ⁻²		
Phosphate (PO ₄) ⁻³		Trivalent (3)



✧ **Chemical formula** : It is a formula that represents the number and the type of atoms in a molecule.

✧ **The following table shows the chemical formulae for some compounds :**

Compound	Chemical formula	Compound	Chemical formula
Sodium hydroxide	NaOH	Copper nitrate	$\text{Cu}(\text{NO}_3)_2$
Magnesium sulphate	MgSO_4	Sulphuric acid	H_2SO_4
Sodium oxide	Na_2O	Copper sulphate	CuSO_4
Sodium carbonate	Na_2CO_3	Ammonium chloride	NH_4Cl
Aluminium sulphate	$\text{Al}_2(\text{SO}_4)_3$	Nitric acid	HNO_3
Calcium phosphate	$\text{Ca}_3(\text{PO}_4)_2$	Magnesium oxide	MgO
Sodium nitrate	NaNO_3	Aluminium oxide	Al_2O_3
Aluminium hydroxide	$\text{Al}(\text{OH})_3$	Silver chloride	AgCl
Magnesium hydroxide	$\text{Mg}(\text{OH})_2$	Calcium nitrate	$\text{Ca}(\text{NO}_3)_2$
Aluminium carbonate	$\text{Al}_2(\text{CO}_3)_3$	Hydrochloric acid	HCl
Copper carbonate	CuCO_3	Sulphur trioxide	SO_3

✧ **Acids** : They are substances dissociated in water producing positive hydrogen ions H^+
[Ex.: $\text{HCl} - \text{H}_2\text{SO}_4 - \text{HNO}_3$].

✧ **Bases** : They are substances dissociated in water producing negative hydroxide ions (OH)
[Ex.: $\text{NaOH} - \text{KOH} - \text{Ca}(\text{OH})_2$].

✧ **Oxides** : They are compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.

✧ **Metal oxides** : They are compounds produced from the combination of oxygen with a metal [Ex.: $\text{Na}_2\text{O} - \text{CaO} - \text{Al}_2\text{O}_3$].

✧ **Nonmetal oxides** : They are compounds produced from the combination of oxygen with a nonmetal. [Ex.: $\text{CO}_2 - \text{SO}_3$].

✧ **Salts** : They are compounds resulted from the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).

Questions ?

on lesson Two

● Remember ● Understand ● Apply ● Higher skills ● School book questions.



Interactive Exercises

1. Choose the correct answer :

1. elements are the most stable elements
 - a. Metals
 - b. Nonmetals
 - c. Noble gases
 - d. Metalloids
2. When a nonmetal gains or shares by two electrons, its valency will be
 - a. monovalent.
 - b. divalent.
 - c. trivalent.
 - d. tetravalent.
3. All of the following elements are monovalent, except
 - a. hydrogen.
 - b. sodium.
 - c. oxygen.
 - d. chlorine.
4. All of the following elements are divalent, except
 - a. $_{12}\text{Mg}$
 - b. $_{7}\text{N}$
 - c. $_{8}\text{O}$
 - d. $_{16}\text{S}$
5. When an atom loses, gains or shares with one electron, whose valency is
 - a. monovalent.
 - b. divalent.
 - c. trivalent.
 - d. tetravalent.
6. The valency of ferrous is
 - a. monovalent.
 - b. divalent.
 - c. trivalent.
 - d. tetravalent.
7. All of the following are nonmetals having more than one valency, except
 - a. copper.
 - b. phosphorus.
 - c. sulphur.
 - d. nitrogen.
8. In trivalent elements, the outermost energy level contains electrons.
 - a. (3) or (5)
 - b. (5) or (6)
 - c. (7) or (1)
 - d. (6) or (3)
9. The valency of argon ($_{18}\text{Ar}$) is
 - a. trivalent.
 - b. divalent.
 - c. monovalent.
 - d. zero.
10. The valency of copper in (Cu_2O) is
 - a. monovalent.
 - b. divalent.
 - c. trivalent.
 - d. tetravalent.
11. The chemical formula of carbonate group is
 - a. $(\text{NO}_3)^-$
 - b. $(\text{SO}_4)^{--}$
 - c. $(\text{NH}_4)^+$
 - d. (CO_3)
12. All of the following are monovalent atomic groups, except group.
 - a. phosphate
 - b. nitrate
 - c. hydroxide
 - d. bicarbonate
13. Which of the following is a trivalent atomic group ?
 - a. Hydroxide.
 - b. Sulphate.
 - c. Ammonium.
 - d. Phosphate.
14. Nitrate and nitrite groups are different in the
 - a. type of atoms
 - b. number of atoms
 - c. valency
 - d. type of charge.
15. Phosphate and sulphate groups are similar in the
 - a. type of atoms
 - b. valency.
 - c. number of atoms
 - d. no correct answer



- 16. The nitrate group is a group.
 - a. monovalent b. divalent c. trivalent d. tetravalent
- 17. All of these atomic groups carry the same charge, except
 - a. nitrite. b. nitrate. c. bicarbonate. d. ammonium.
- 18. The molecules of sodium hydroxide, water and sulphuric acid share in the presence of in each of them.
 - a. hydrogen and nitrogen b. oxygen and sodium
 - c. hydrogen and oxygen d. hydrogen and sodium
- 19. The chemical formula of carbon dioxide(CO_2) shows that the valency of carbon is
 - a. monovalent. b. divalent. c. trivalent. d. tetravalent.
- 20. Element (M) forms a compound $\text{M}(\text{OH})_3$ so, its valency is
 - a. monovalent. b. divalent. c. trivalent. d. tetravalent.
- 21. The chemical formula of calcium bicarbonate is
 - a. CaCO_3 b. $\text{CaH}(\text{CO}_3)_2$ c. $\text{Ca}(\text{HCO}_3)_2$ d. Ca_2HCO_3
- 22. Each aluminium atom ($_{13}\text{Al}$) combines with atoms of chlorine ($_{17}\text{Cl}$) to form aluminium chloride molecule.
 - a. two b. three c. four d. five
- 23. The chemical formula of sodium hydroxide is
 - a. NaOH b. NaCO_3 c. NaHCO_3 d. $\text{Na}_2(\text{CO}_3)_2$
- 24. The chemical formula of sulphuric acid is
 - a. H_2O b. HCl c. H_2SO_4 d. HNO_3
- 25. Sulphuric acid is composed of
 - a. five atoms of three different elements.
 - b. six atoms of three different elements.
 - c. seven atoms of three different elements.
 - d. eight atoms of four different elements.
- 26. In ammonia molecule (NH_3), the number 3 refers to the number of
 - a. N & H atoms in one molecule. b. H atoms in one molecule.
 - c. the valency of hydrogen. d. N atoms in one molecule.
- 27. The chemical formula of sodium nitrite is
 - a. NaNO b. NaNO_3 c. NaNO_2 d. Na_2NO_3
- 28. In the compound $\text{X}(\text{NO}_3)_2$, the valency of element (X) is
 - a. monovalent. b. divalent. c. trivalent. d. tetravalent.
- 29. The number of atoms in ammonium nitrate molecule equals
 - a. 5 b. 7 c. 8 d. 9

- 30. When an acid dissolves in water, it produces ions.
a. $(\text{OH})^+$ b. H^- c. H^+ d. (OH)
- 31. When an alkali (base) dissolves in water, it gives ions
a. H^+ b. $(\text{OH})^-$ c. $(\text{OH})^{-2}$ d. $(\text{OH})^+$
- 32. All of these substances turn litmus paper into red, except
a. HCl b. HNO_3 c. NaOH d. H_2SO_4
- 33. Mona bought a cup of yogurt and found the taste is sour, so she concluded that it contains a compound from ..
a. acids. b. bases. c. salts. d. oxides.
- 34. All of these substances turn litmus paper into blue, except
a. NaOH b. KOH c. $\text{Ca}(\text{OH})_2$ d. HBr
- 35. All of the aqueous solutions of the following compounds have bitter taste, except
a. sodium hydroxide. b. sulphuric acid.
c. calcium hydroxide. d. potassium hydroxide.
- 36. All of these are nonmetal oxides, except .
a. CO_2 b. P_2O_5 c. SO_3 d. Al_2O_3
- 37. Sodium chloride is
a. an acid. b. an oxide. c. a base. d. a salt.
- 38. The salt that is formed on the combination of a positive metal ion with a negative atomic group is
a. NaCl b. Na_2CO_3 c. $(\text{NH}_4)_2\text{SO}_4$ d. NaBr
- 39. On the combination of $(\text{Mg})^{+2}$ ion with $(\text{CO}_3)^{-2}$ group. is formed
a. an acid b. a base c. an oxide d. a salt
- 40. The salt that is formed on the combination of a positive atomic group with a negative atomic group is
a. NH_4Cl b. $(\text{NH}_4)_2\text{CO}_3$ c. Na_2SO_4 d. NH_4Br
- 41. Ammonium chloride salt is formed on the combination of
a. a positive metal ion with a negative atomic group.
b. a positive metal ion with a negative nonmetal ion.
c. a negative nonmetal ion with a positive atomic group.
d. a negative nonmetal ion with a negative nonmetal ion.
- 42. All of these salts dissolve in water, except
a. sodium chloride. b. potassium sulphate.
c. silver chloride. d. sodium sulphide.



2. Choose from column (B), what suits it in column (A) :

(A)	(B)
1. $(\text{PO}_4)^{-3}$	a. Nitrate group.
2. $(\text{OH})^-$	b. Bicarbonate group.
3. $(\text{CO}_3)^{-2}$	c. Nitrite group.
4. $(\text{NO}_3)^-$	d. Sulphate group.
5. $(\text{SO}_4)^{-2}$	e. Carbonate group.
6. $(\text{HCO}_3)^-$	f. Ammonium group.
7. $(\text{NO}_2)^-$	g. Phosphate group.
8. $(\text{NH}_4)^+$	h. Hydroxide group.

3. Choose from columns (B) & (C) what suit them in column (A) :

(A)	(B)	(C)
1. Sulphuric acid	a. KOH	A. A salt dissolves in water.
2. Sodium sulphide	b. H_2SO_4	B. Its solution changes the colour of litmus paper into blue.
3. Lead iodide	c. Na_2S	C. Its solution changes the colour of litmus paper into red.
4. Potassium hydroxide	d. PbI_2	D. A salt doesn't dissolve in water.

(A)	(B)	(C)
(Common name)	(Chemical name)	(Chemical formula)
1. Caustic soda	a. Sodium hydroxide.	A. NaCl
2. Table salt	b. Calcium hydroxide.	B. NaOH
3. Limewater	c. Sodium chloride.	C. $\text{Ca}(\text{OH})_2$

4. Put (✓) or (×) in front of the following statements and correct the wrong ones :

1. An element of atomic number 20, so its valency is divalent. ()
2. Ferrous carries three negative charges. ()
3. Water molecule consists of four atoms for two elements. ()
4. The valency of noble gases is monovalent. ()
5. The atomic group acts as a compound in the chemical reaction. ()

- 6. Both nitrate and nitrite groups have the same valency. ()
- 7. The chemical formula indicates the type and the number of atoms in a certain molecule. ()
- 8. The chemical formula of carbonate group is $(\text{HCO}_3)^-$ ()
- 9. In the compound (XY_2) , (Y) is divalent and (X) is monovalent. ()
- 10. A compound (X_2O_3) , so the valency of element (X) is monovalent ()
- 11. Both lithium bicarbonate and sodium carbonate have the same number of atoms ()
- 12. The molecule of sodium sulphate consists of three different elements ()
- 13. The chemical formula of calcium carbonate is (CaCO_3) . ()
- 14. The chemical formula of aluminium sulphate is $\text{Al}_3(\text{SO}_4)_2$ ()
- 15. (SO_2) is the symbol of sodium oxide. ()
- 16. The chemical formula of silver nitrate is (AgNO_3) ()
- 17. The valency of sodium in (NaCl) is monovalent, while it is divalent in (Na_2CO_3) ()
- 18. Table salt is formed of two divalent elements. ()
- 19. The chemical formula of calcium hydroxide molecule is (CaOH) . ()
- 20. The chemical formula of nitric acid is (HNO_3) , while that of sulphuric acid is (H_2S) . ()
- 21. The valency of sulphur in sulphur trioxide (SO_3) is tetravalent ()
- 22. Oxides are substances that dissociate in water producing positive hydrogen ions. ()
- 23. Sodium hydroxide changes the colour of litmus paper into red. ()
- 24. Mineral acids are formed when hydrogen joined with a negative atomic group except nitrate group. ()
- 25. When an element ($_{11}\text{Z}$) combines with oxygen, it produces (ZO) oxide which is a metal oxide. ()
- 26. Aluminium oxide is a metal oxide, while carbon dioxide is a nonmetal oxide. ()
- 27. Caustic soda and limewater are from bases, while magnesium carbonate is from salts. ()
- 28. The combination of metals with oxygen form oxides, while the combination of metals with nonmetals form bases. ()
- 29. Sodium chloride is considered a base. ()
- 30. Silver chloride is water soluble, while sodium chloride is water insoluble. ()

5. Write the scientific term of each of the following :

- 1. The number of electrons gained, lost or even shared with an atom during a chemical reaction
- 2. Elements, their valencies are zero.



- 3. A set of atoms joined together, behave like one atom only, having a certain valency and it can't be existed solely.
- 4. A formula represents the number and the type of atoms in a molecule
- 5. Compounds are dissolved (dissociated) in water producing positive hydrogen ions H^+ .
 - Compounds have sour taste and turn litmus paper into red.
- 6. Compounds (substances) are dissociated in water producing negative hydroxide ions $(OH)^-$.
 - Compounds have bitter taste and turn litmus paper into blue.
- 7 Compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.
- 8 Oxides produced due to the combination of oxygen with a metal
- 9 Oxides produced due to the combination of oxygen with a nonmetal
- 10 Compounds produced as a result of the chemical combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).

6. Complete the following statements :

- 1. The valency of metals may be _____, _____ or trivalent as their outermost energy shells have 1, 2 or 3 electrons.
- 2. The valency of aluminium ($^{27}_{13}Al$) is _____, while that of calcium ($^{40}_{20}Ca$) is _____
- 3. Some metallic elements have more than one valency, such as _____ and _____
- 4. The valency of iron is _____ in ferrous chloride, while in ferric chloride is _____
- 5. Some nonmetallic elements have more than one valency such as _____, _____ and _____
- 6. The valency of a sulphur atom may be ... _____, _____ or _____
- 7. Phosphorus element has two valencies which are _____ and _____
- 8. The valency of noble gases is _____ as their outermost energy level is with _____ electrons.
- 9. The valency of ($^{39}_{19}K$) is _____, while the valency of $(SO_4)^{-2}$ is _____
- 10. _____ and _____ are examples of monovalent atomic groups, while _____ and _____ are examples of divalent atomic groups.
- 11 The valency of a carbonate group is _____, while that of a bicarbonate group is _____
- 12. The symbol of phosphate group is _____ and its valency is _____
- 13. The symbol of sulphate group is _____ and it is formed of _____ atoms of _____ different elements.

14. The difference between nitrate group and nitrite group is one _____ atom.
15. The chemical formula of sodium carbonate is _____ and it consists of _____ atoms of _____ different elements.
16. If the chemical formula of aluminium sulphate is $\text{Al}_2(\text{SO}_4)_3$, so the valency of aluminium atom is _____, while the valency of sulphate group is _____.
17. The chemical formula of magnesium sulphate is _____, while that of calcium nitrate is _____.
18. The chemical formula of hydrochloric acid is _____, but the chemical formula of sodium hydroxide is _____.
19. The chemical formula of water is _____, but the chemical formula of sulphuric acid is _____.
20. A compound has a chemical formula (XO_2) so the valency of (X) is _____.
21. The valency of calcium is _____ and when it combines with phosphate group, a compound is formed its formula is _____.
22. (Na_2O) is the chemical formula of _____, while the chemical formula of magnesium carbonate is _____.
23. The valency of sodium in sodium carbonate (Na_2CO_3) is _____ and its valency in sodium chloride (NaCl) is _____.
24. Compounds are classified according to their properties into _____, bases, and _____.
25. On dissolving in water, acids give positive _____ ions and alkalis give negative _____ ions.
26. Acids have _____ taste and change the colour of litmus paper into _____, while bases have _____ taste and change the colour of litmus paper into _____.
27. _____ and _____ are examples of bases.
28. _____ is from acids that contains oxygen, while _____ is from acids that doesn't contain oxygen.
29. (H_2SO_4) is _____, while (NaOH) is _____.
30. The symbols of all mineral acids begin with _____ atom, while the symbols of all bases end with _____ group.
31. _____ is an example of metal oxides, while _____ is an example of nonmetal oxides.
32. Sodium sulphide is from the salts that _____ in water, while lead sulphate is from the salts that _____ in water.



7. Complete the following table :

Compound	Chemical formula	No. of atoms in the molecule	No. of elements forming the molecule	Its type
1 Sodium carbonate				
2	CuCO_3			
3 Sodium hydroxide			3	
4	$\text{Al}_2(\text{SO}_4)_3$	17		
5 Calcium oxide				
6	$\text{Mg}(\text{NO}_3)_2$		3	
7. Copper nitrite				
8. Aluminium hydroxide		7		
9	CaCO_3			
10. Sulphuric acid				
11.	MgO			
12. Sodium phosphate				

8. Give reasons for :

- 1 Potassium ($_{19}\text{K}$) is monovalent, while oxygen ($_{8}\text{O}$) is divalent.
- 2 Both sodium ($_{11}\text{Na}$) and chlorine ($_{17}\text{Cl}$) are monovalent although they have different atomic numbers.
- 3 The valency of noble gases is zero.
- 4 Magnesium ($_{12}\text{Mg}$) is divalent, while aluminium ($_{13}\text{Al}$) is trivalent.
- 5 An oxygen atom combines with two atoms of sodium when composing one molecule of sodium oxide.
- 6 The chemical formula of sodium carbonate is (Na_2CO_3) .
- 7 The chemical formula of water is (H_2O) .
- 8 Acids have an effect on litmus paper which is different from bases.
- 9 All acids turn the colour of litmus into red and having a sour taste, while all bases turn the colour of litmus into blue with a bitter taste.
- 10 We can obtain sodium chloride (NaCl) solution and not silver chloride (AgCl) solution.
11. Caustic soda is from bases, while lead bromide is from salts.

9. What is meant by each of the following ... ?

- | | |
|----------------------|--|
| 1. Valency. | 2. Magnesium ($_{12}\text{Mg}$) is a divalent element. |
| 3. Fe^{+3} | 4. A trivalent nonmetallic element. |
| 5. Atomic group. | 6. Chemical formula. |
| 7. Acids. | 8. Bases. |
| 9. Oxides. | 10. Metal oxides. |
| 11. Nonmetal oxides. | 12. Salts. |

10. Choose the odd word (or formula) and mention the relation between the rest :

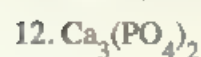
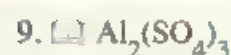
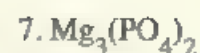
- Lithium / Silver / Aluminium / Sodium.
- Calcium / Magnesium / Lead / Oxygen.
- Phosphorus / Nitrogen / Sulphur / Chlorine.
- Bromine / Chlorine / Iodine / Potassium.
- Zinc / Calcium / Mercury / Aluminium / Lead.
- Ammonium / Phosphate / Carbonate / Nitrate.
- NaOH / $\text{Ca}(\text{OH})_2$ / KOH / HCl
- Al_2O_3 / SO_3 / SO_2 / CO_2
- K_2O / Al_2O_3 / SO_3 / CaO
- H_2O / HBr / HCl / HNO_3
- NaCl / K_2SO_4 / AgCl / Na_2S

11. Give an example of each of the following :

- | | |
|--|--------------------------------------|
| 1. A monovalent metallic element. | 2. A monovalent nonmetallic element. |
| 3. A divalent nonmetallic element. | 4. A trivalent nonmetallic element. |
| 5. An element, its valency is zero. | 6. A monovalent atomic group. |
| 7. A trivalent atomic group. | 8. A divalent atomic group. |
| 9. A base. | 10. An acid doesn't contain oxygen. |
| 11. A metal oxide. | 12. An acid contains oxygen. |
| 13. A salt doesn't dissolve in water. | 14. A salt dissolves in water. |
| 15. A compound turns the red litmus paper into blue. | |

12. Write the names of the following compounds and mention the number of atoms for each :

- | | | |
|----------------------------|-----------------------------|-----------------------------|
| 1. CaSO_4 | 2. LiHCO_3 | 3. $\text{Mg}(\text{OH})_2$ |
| 4. H_2SO_4 | 5. Na_3PO_4 | 6. KNO_3 |



13. Write the chemical formula for the following compounds :

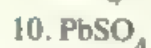
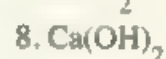
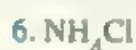
- | | | |
|-------------------------|-----------------------------------|------------------------------|
| 1. Sodium hydroxide. | 2. Sodium bicarbonate. | 3. Sodium sulphate |
| 4. Copper nitrate. | 5. Magnesium oxide. | 6. Nitric acid. |
| 7. Sulphuric acid. | 8. Calcium hydroxide (Limewater). | |
| 9. Calcium bicarbonate. | 10. Calcium sulphate | 11. Iron II (ferrous) oxide. |
| 12. Potassium chloride. | 13. Copper sulphate. | 14. Aluminium oxide |
| 15. Calcium nitrate. | 16. Silver nitrate. | 17. Silver chloride. |
| 18. Hydrochloric acid. | 19. Table salt. | 20. Calcium chloride. |
| 21. Aluminium hydroxide | 22. Ammonium chloride | 23. Potassium sulphate. |
| 24. Sodium carbonate | 25. Sodium oxide. | 26. Potassium carbonate. |
| 27. Sulphur trioxide. | 28. Water. | |

14. Mention the properties of :

1. Acids.

2. Bases.

15. Identify the type of the following compounds :



16. Compare between :

- Acids and bases [giving examples of each].
- Carbonate group and bicarbonate group [According to : Chemical formula - Valency Number of atoms].
- Potassium sulphate and lead sulphate [According to : Chemical formula - Solubility in water].
- Metal oxides and nonmetal oxides.

17. Once you collected an amount of rain water and another amount of sea water, and placed a litmus paper in each sample of water. You observed that its colour changed into red in case of rain water where it changed into blue in case of sea water. Explain.

18. Form the following formulae from [H, K, SO_4 , OH]

1. A chemical formula for an acid.
2. A chemical formula for a base.
3. A chemical formula for a salt.

19. Mention the valency of sulphur in the following compounds, and mention their type :

- | | | | |
|------------------|------------------|--------------------------|-------------------------|
| 1. SO_3 | 2. SO_2 | 3. Na_2S | 4. H_2S |
|------------------|------------------|--------------------------|-------------------------|

20. If you have an element (${}^{39}_{19}\text{X}$) :

1. Mention its kind. Why ?
2. Mention its valency (give a reason).
3. Write the chemical formula of its oxide.
4. Complete : It combines with sulphate group to give salt.

21. Two elements (X) and (Y), their atomic numbers are 11 and 17 respectively, answer the following questions :

1. Write the electronic distribution of each one.
2. What is the valency of each one? (give a reason).
3. What is the type of the compound produced due to their combination ?

22. If you have four elements (${}_9\text{X}$, ${}_{13}\text{Y}$, ${}_7\text{Z}$, ${}_{20}\text{Q}$)

1. Write the electronic distribution of each one, then conclude the type and the valency of each element.
2. What is the type of the compound produced from :
 - a) Combination between element (X) and element (Y).
 - b) Combination between element (Y) and oxygen (${}_8\text{O}$), write the chemical formula
3. What is the type of the combination resulted between element (X) and element (Q) ?
Write the chemical formula of the produced compound.

23. Element (X) combines with oxygen forming (X_2O) oxide .

1. Mention the valency of this element.
2. What is the type of the produced oxide ?



24. Study the following figures, then answer the following questions :

1 Look at the following diagrams, then answer :



Element (A)

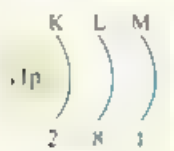


Element (B)

1. Mention the valency of two elements (give a reason).
2. Write the name and the chemical formula for the compound, which is produced from the combination between element (A) and element (B).

2 Choose the suitable diagram for each of the following statements :

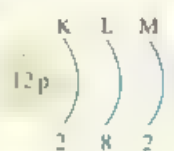
1. A divalent metallic element.
2. A divalent nonmetallic element.
3. A noble gas.
4. A monovalent nonmetallic element.
5. A monovalent metallic element.



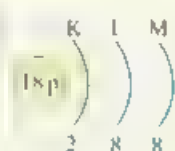
(A)



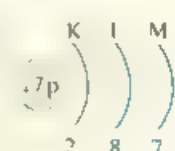
(B)



(C)



(D)



(E)

3 If you have four tubes as in the figure, answer the following questions :

1. Write the chemical formula of each one.
2. Identify the type of each of them.
3. What is the effect of putting blue litmus paper on tubes (2) and (3) ?
4. What happens by adding water to tube (1) with shaking ?
5. What is the type of chemical bond in the compound of tube (4) ?



Calcium nitrate
(1)



Sodium hydroxide
(2)



Sulphuric acid
(3)



Silver nitrate
(4)

Thinking Skills

Questions

1. Choose the correct answer :

- The atom of element _____ changes into negative ion carries one negative charge during the chemical reaction.
a. F b. Fe c. C d. Ag
- The number of atoms equals the number of elements in the molecule of _____
a. sodium hydroxide. b. water. c. calcium sulphate d. sodium nitrate
- The atomic group that is formed of the same elements of water is
a. carbonate. b. hydroxide. c. sulphate. d. nitrate.
- When an element ($_{13}\text{X}$) combines with oxygen atom, the symbol of the produced oxide is
a. XO b. X_2O_3 c. X_2O d. X_3O_2
- Which of the following compounds contains the largest number of atoms ?
a. Sodium hydroxide. b. Sulphuric acid.
c. Aluminium sulphate. d. Carbon dioxide.
- The number of electrons which exist in an ion of trivalent nonmetal element, the electrons of its atom revolve in 3 energy levels is ..
a. 8 b. 10 c. 18 d. 20
- From the opposite two figures, when element (X) combines with element (Y) produce
a. XY b. XY_2
c. X_6Y d. X_2Y



2. Complete the following statements :

- The metallic element (X) that reacts with oxygen forming a compound, whose formula is (XO) and has two energy levels, so its valency is _____ and its atomic number equals _____
- If the formula of oxide of element (M) is (MO), so the formula for its nitrate is _____ and the formula of its phosphate is _____



3. A metallic element (X), its outermost energy level is M and its valency equals the number of energy levels of its ion and its mass number is doubled its atomic number. Find :

1. a. The atomic number.
b. The mass number.
c. The valency of the element.
- 2 Write the chemical formula for the compound molecule that is resulted from the combination of this element with oxygen.

4. A metallic element (X), whose electrons are distributed in three energy levels reacts with oxygen (${}_8\text{O}$) forming a compound, whose formula is (XO). Answer the following questions :

1. Find the atomic number and the valency of element (X).
2. Mention the type of the ion of element (X) and the number of charges that it carries.
- 3 What is the type of chemical bond in the compound (XO) ?

4. Choose :

(1) The ion of the element (X) combines with _____ forming salt.

- a. Na^+ b. Ar c. $(\text{NH}_4)^+$ d. I^-

(2) When the ion of element (X) combines with sulphate group, a compound is formed, its formula is _____

- a. $\text{X}(\text{SO}_4)_3$ b. $\text{X}_2(\text{SO}_4)_3$ c. XSO_4 d. X_2SO_4

5. A metallic element (X) combines with chlorine element forming a compound, whose formula is (XCl_3) , if the number of energy levels in this element equals to the number of electrons in outermost energy level of its atom. Determine :

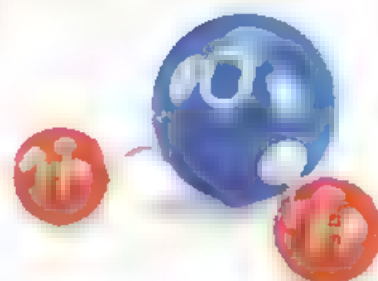
1. The atomic number and the valency of element (X).
2. The type of chemical bond in the compound (XCl_3) .
3. The type of compound (XCl_3) .
4. The chemical formula for hydroxide of element (X).

Chemical Equation & Chemical Reaction



What is meant by the chemical reaction?

You have known from the previous studies that the compound is a substance formed from the combination of atoms of different elements as due to a chemical reaction between them.



To understand the concept of chemical reaction, we carry out the following activity.

Activity 1

Steps:

- Hold a piece of magnesium ribbon by a test tube holder
- Burn the ribbon in air.

Observation:

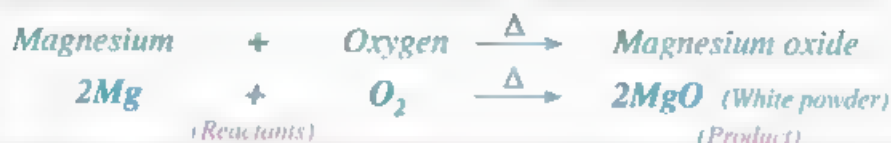
The solid magnesium ribbon burns and changes from a bendable bright solid into a white powder of a new substance.





Conclusion:

Magnesium reacts with atmospheric oxygen (reactants) to form a new substance which is magnesium oxide (product).



➡ The previous reaction, can be explained as follows :

- 1 Heat energy has broken the double covalent bond in an oxygen molecule (O_2) to give two active oxygen atoms.



- 2 Each oxygen atom combines with a magnesium atom to form a molecule of magnesium oxide by an ionic bond.



The mass of white powder formed from burning of a magnesium ribbon is more than the mass of the ribbon before burning as a result of combination of oxygen with magnesium.

➡ From the previous activity, we can define the chemical reaction as follows :

Chemical reaction

It is the breaking of the existing bonds between the atoms of the molecules in the reactants and forming new bonds between the atoms of the molecules in the products.

Question

Complete :

The chemical reaction is the breaking of the existing bonds between the atoms of the molecules in the reactants and forming new bonds between the atoms of the molecules in the products.



Chemical equation

A chemical reaction can be represented by "Chemical equation".



Chemical equation

It is a set of symbols and chemical formulae representing the reactants and the products molecules in the chemical reaction and it represents the conditions of the reaction as well



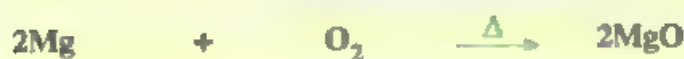
Life application 1 :

The word equation and symbolic equation expressing the reaction of magnesium with oxygen.

Word equation



Symbolic equation



- The chemical equation must be **balanced** that means :
The number of atoms of each element in reactants must equal the number of atoms of the same element in products.

The balanced chemical equation

It is an equation in which the number of atoms entering a reaction equals the number of atoms resulting from this reaction.

Question

Complete :

- In the reaction : $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$

- (a) The _____ bond in an oxygen molecule is broken to give --
- (b) The magnesium atom combines with _____ atom to form _____ molecule.

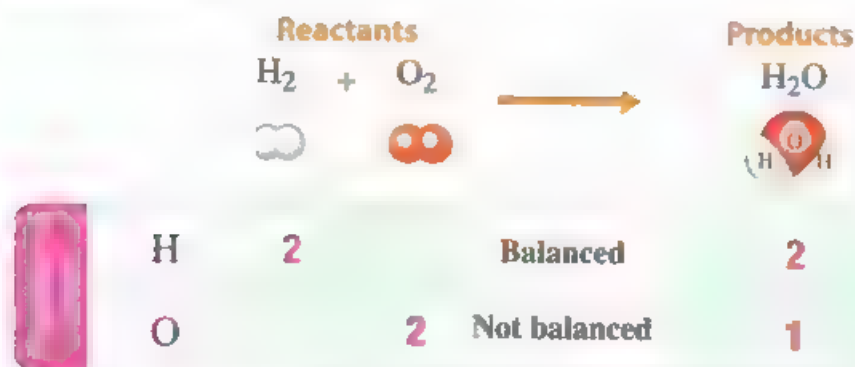


Life application 2:

How to balance the symbolic equation that expresses the reaction of hydrogen gas with oxygen gas to form water : $\text{H}_2 + \text{O}_2 \longrightarrow \text{H}_2\text{O}$

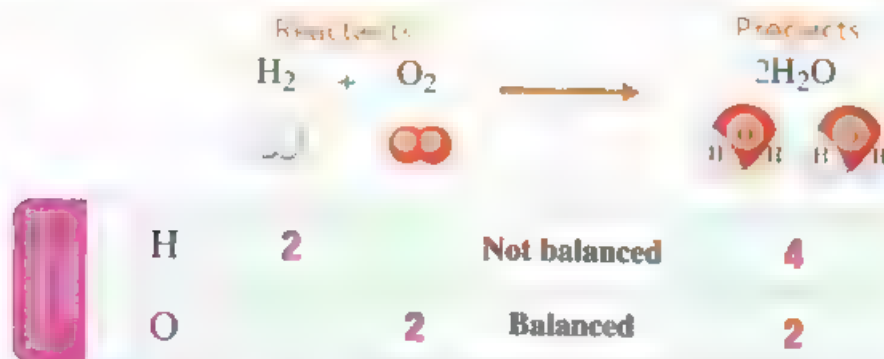
- To balance the equation, you must compare between the number of atoms of each element in reactants and the number of atoms of the same element in products.

When comparing the number of hydrogen atoms and oxygen atoms in reactants and products as follows :



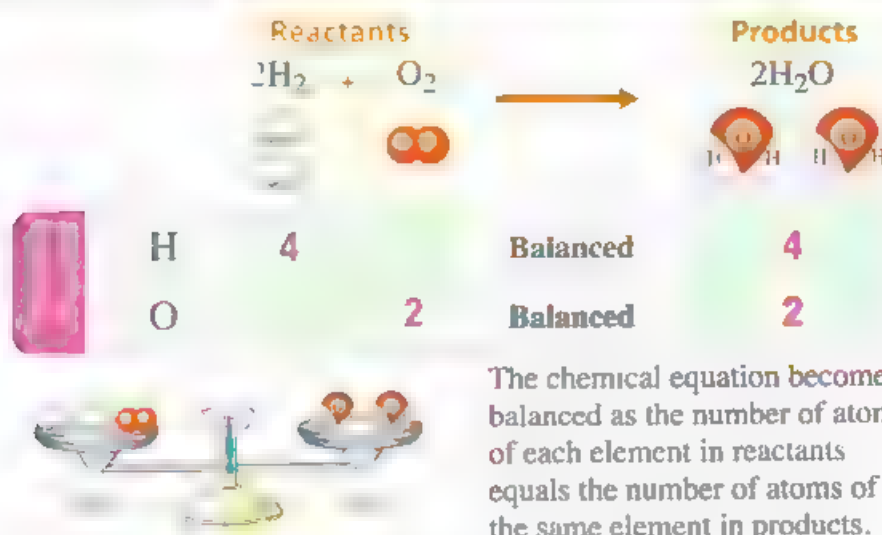
We find that, the chemical equation is not balanced as the number of oxygen atoms in reactants is more than their number in products.

To balance the number of oxygen atoms, it must be multiplied $2 \times \text{H}_2\text{O}$ as follows :



We find that, the chemical equation is not balanced as the number of hydrogen atoms in reactants is less than their number in products.

To balance the number of hydrogen atoms, it must be multiplied $2 \times \text{H}_2$ as follows :



? Exercise 1

Balance the following chemical equations :

1. $\text{Na} + \text{Cl}_2 \longrightarrow$ NaCl
2. $\text{H}_2 +$ $\text{NO} \longrightarrow$ $\text{H}_2\text{O} + \text{N}_2$

Answer

- (1) $2 - 2$ (2) $2 - 2 - 2$

Laws of chemical combination

First : Law of conservation of matter (mass).

Second : Law of constant ratios.

FIRST

- Law of conservation of matter states that the matter is neither created nor destroyed, but it can be changed from one form to another.
- By applying the law of conservation of matter on chemical reactions, we can define it as follows :

Law of conservation of matter (mass)

The sum of reactants masses in any chemical reaction equals the sum of products masses.

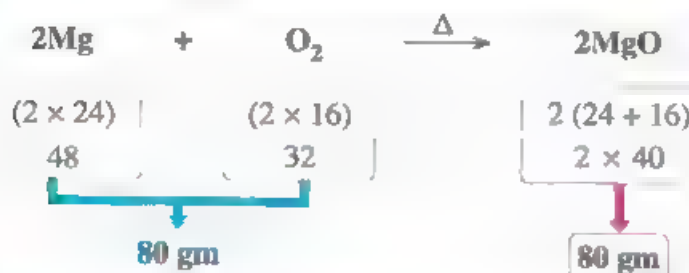


The mass of reactants = The mass of products



Life application 3:

Achieving the law of conservation of matter in the reaction of magnesium with oxygen.



*The atomic masses of
[Mg = 24, O = 16]*

- The sum of reactants masses = $(2 \times 24) + (2 \times 16) = 48 + 32 = 80 \text{ gm}$.
- The sum of products masses = $2(24 + 16) = 2 \times 40 = 80 \text{ gm}$.

i.e.

The sum of reactants masses = The sum of products masses

Which achieves the law of conservation of matter.

G.R. A chemical equation should be balanced.
To achieve the law of conservation of matter.

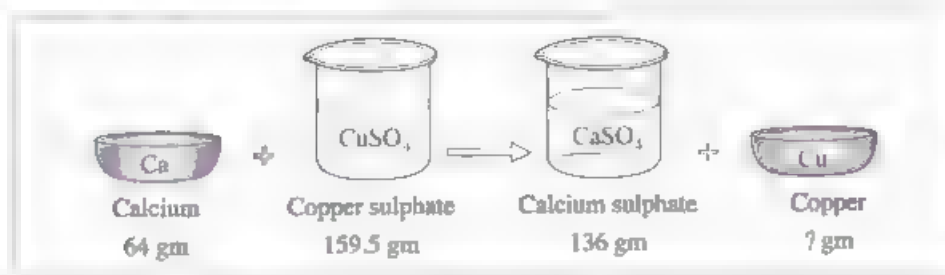
Examples :

- 1 Hydrogen gas reacts with chlorine gas forming hydrogen chloride *Express this reaction with a balanced symbolic equation and word equation with achieving the law of conservation of matter.* [knowing that the atomic masses of H = 1 & Cl = 35.5].

Solution

- **Word equation :** Hydrogen + Chlorine \longrightarrow Hydrogen chloride
- **Symbolic equation :** $\text{H}_2 + \text{Cl}_2 \longrightarrow 2\text{HCl}$
 $(2 \times 1) \quad (2 \times 35.5) \qquad 2(1 + 35.5)$
- The sum of reactants masses = $(2 \times 1) + (2 \times 35.5) = 2 + 71 = 73 \text{ gm}$
- The sum of products masses = $2(1 + 35.5) = 2 \times 36.5 = 73 \text{ gm}$.
- \therefore The sum of reactants masses equals the sum of products masses.
Which achieves the law of conservation of matter.

- 2 What is the mass of copper (Cu) resulted from the following reaction ?



Solution



According to the law of conservation of matter :

- The mass of calcium + The mass of copper sulphate
= The mass of calcium sulphate + The mass of copper.
- The mass of copper = (The mass of calcium + The mass of copper sulphate)
– The mass of calcium sulphate.
- The mass of copper = $(64 + 159.5) - 136$
= $223.5 - 136$
= 87.5 gm.

- 3 Achieve from the following equation if it is balanced or not by applying the law of conservation of matter on it : $\text{NaNO}_3 \xrightarrow{\Delta} \text{NaNO}_2 + \text{O}_2$
[knowing that the atomic masses of Na = 23, N = 14 & O = 16].

Solution



- The sum of reactants masses = $23 + 14 + (3 \times 16) = 37 + 48 = 85$ gm.
- The sum of products masses = $[23 + 14 + (2 \times 16)] + (2 \times 16) = 37 + 32 + 32 = 101$ gm
- ∴ The sum of reactants masses doesn't equal the sum of products masses.
- ∴ The equation is not balanced because the law of conservation of matter is not achieved.



SECOND

Law of constant ratios

The chemical compound is produced from a chemical combination of atoms of two elements or more by constant weight ratios.

Example :

During the reaction between magnesium and oxygen to form magnesium oxide several times by different weight masses, we notice the following results.

Reactants		Product	Ratio between magnesium : oxygen	
2Mg	O ₂	2MgO		
48 gm Magnesium	32 gm Oxygen	80 gm Magnesium oxide	48 gm	: 32 gm
			3	2
24 gm Magnesium	16 gm Oxygen	40 gm Magnesium oxide	24 gm	: 16 gm
			3	2

➔ From the previous example, we conclude that

Magnesium oxide compound is always formed from combination between magnesium and oxygen elements respectively by constant weight ratio (3 2) however the masses of the elements involved in the reaction changed, according to the law of constant ratios

Law of constant ratios

The chemical compound is formed from combination of its elements by constant weight ratios.

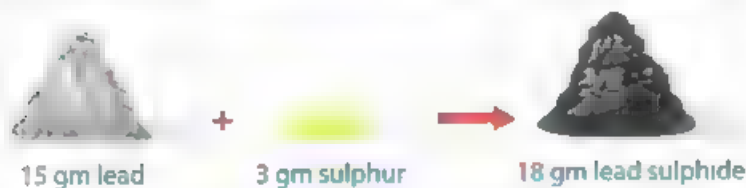


If the ratio between the masses of elements that enter the chemical reaction differs from the fixed ratio which these elements react with to form a certain compound so, the increase in the mass of each of them remains without reaction.

Life application 4:

Reaction of lead with sulphur according to the law of constant ratios.

- 3 gm of sulphur combines completely with 15 gm of lead to form 18 gm of lead sulphide



- On adding 6 gm of sulphur to 15 gm of lead, 3 gm only of sulphur combines with 15 gm of lead forming 18 gm of lead sulphide and 3 gm of sulphur remains without reaction.



- On adding 3 gm of sulphur to 20 gm of lead, 3 gm of sulphur combines with 15 gm only of lead forming 18 gm of lead sulphide and 5 gm of lead remains without reaction.



Question

In the chemical reaction :



2 gm of the element (X) is completely combined with 3 gm of the element (Y) to form 5 gm of the compound (XY).

- Calculate the mass of each of the reactants, the resulting compound and remaining material (if it is found) **when adding** :
 - 3 gm of element X to 3 gm of element Y.
 - 2 gm of element X to 5 gm of element Y.
- What do you conclude from the results you have got ? And what's the law that explains your conclusion ?

TRY to answer
worksheet
in the Notebook

6



Types of chemical reactions

There are many types of chemical reactions. We will study **one** of them, which is direct combination reactions :

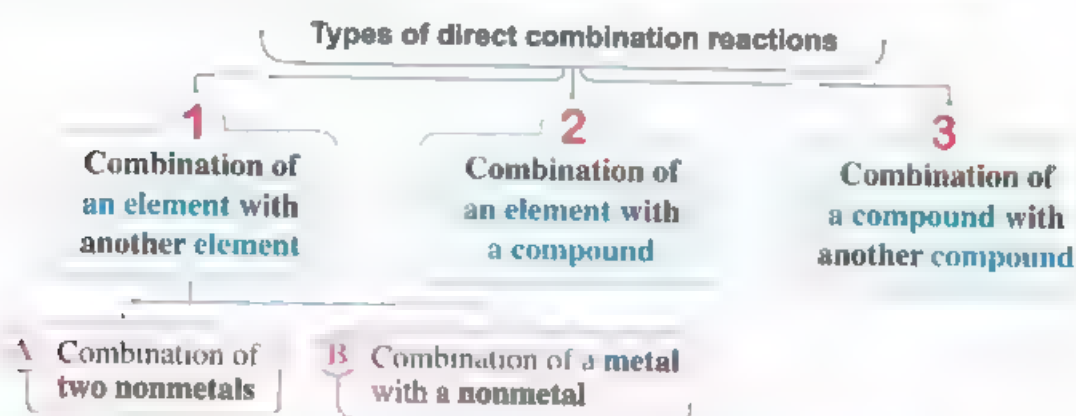
Direct combination reactions

Direct combination reactions

They are the reactions which involve a combination of two or more substances to form a new compound.



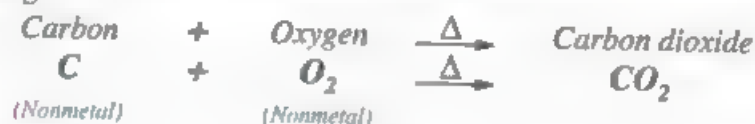
➡ The following diagram shows the types of direct combination reactions :



1 Combination of an element with another element

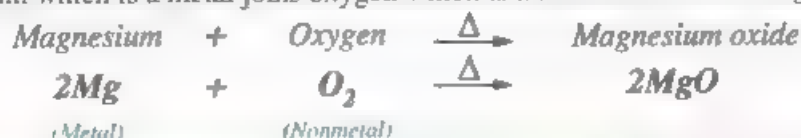
A Combination of two nonmetals

Ex. 1 Carbon which is a nonmetal joins oxygen which is a nonmetal to form carbon dioxide gas.



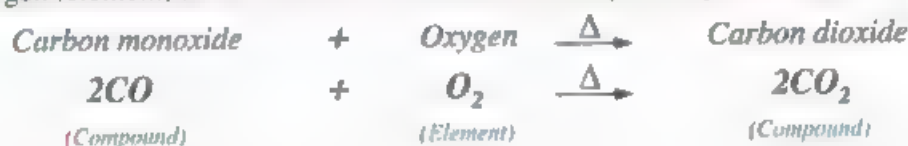
B Combination of a metal with a nonmetal

Ex. Magnesium which is a metal joins oxygen which is a nonmetal to form magnesium oxide.



Combination of an element with a compound

Ex. 1 Oxygen (element) reacts with carbon monoxide (compound) producing carbon dioxide



Combination of a compound with another compound

Example Combination of ammonia gas (compound) and hydrochloric acid (compound).

Activity 2

Step:

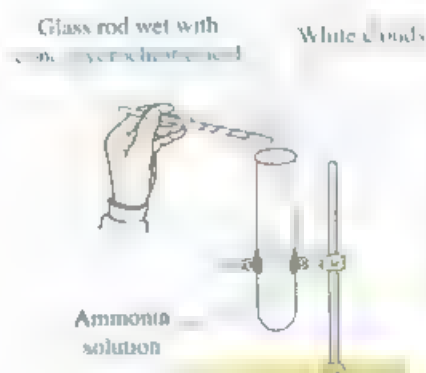
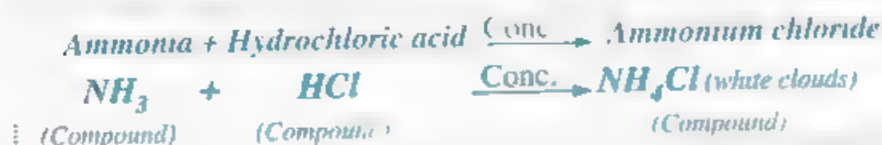
Place a glass rod wet with conc. hydrochloric acid (HCl) close to the mouth of a test tube containing ammonia solution.

Observation:

White clouds of ammonium chloride (NH_4Cl) are formed.

Conclusion:

Ammonia gas (NH_3) [evolves from ammonia solution] combines with hydrochloric acid (HCl) to give ammonium chloride (NH_4Cl) (white clouds)





Exercise 2

Determine the types of the following direct combination reactions.



Answer

1. Reaction between an element and a compound.
2. Reaction between an element and another element.
3. Reaction between a compound and another compound.

Chemical reactions in our life

Some chemical reactions play an essential role in our life, while others have negative impacts (effects) on both human beings and environment.

1 Importance of chemical reactions

➤ Chemical reactions play an important role in our life **G.R.**

Because through which it is possible to :

- A. Obtain electric and heat energies used in some industries.
- B. Obtain more useful substances from less used substances.
- C. Prepare thousands of compounds are commonly used in many industries **such as :**

① Manufacture of medicines



② Manufacture of fertilizers



③ Manufacture of fuel



④ Manufacture of plastics



⑤ Food industries



⑥ Manufacture of car batteries

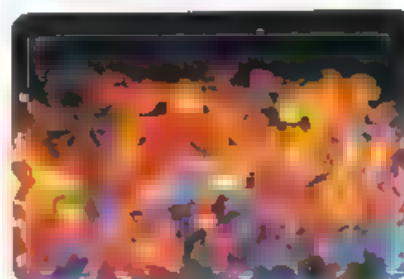


Negative effects of chemical reactions

- From negative effects of chemical reactions is the **environmental pollution** resulting from the emission of some harmful gases from these chemical reactions.
- The burning reaction is considered from the reactions that produce a lot of pollutant gases **such as** :

A Burning of coal and cellulose fibres :

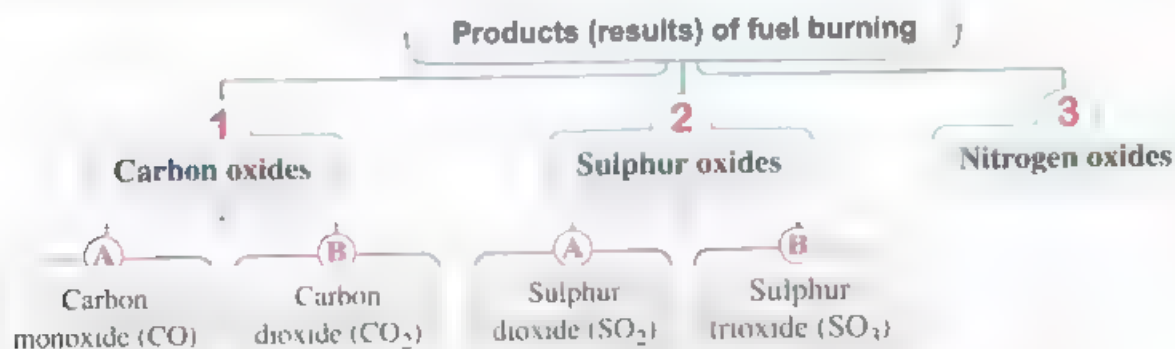
Such as burning paper and cigarettes cause air pollution and lung cancer.



B Fuel burning :

It is an example of environmental pollution due to the presence of harmful gases.

- The following diagram shows the products of fuel burning.



1 Carbon oxides

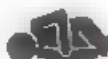
(A) Carbon monoxide (CO)

Carbon monoxide (CO) has a dangerous impact on the human being **G.R.**

As it causes :



• Headache.



• Fainting.



• Severe stomach-aches and may lead to death.

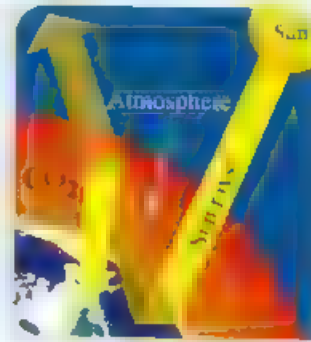
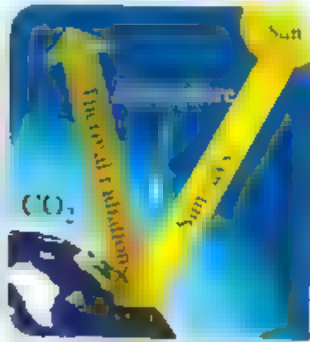




(B) Carbon dioxide (CO_2)

Increasing the percentage of carbon dioxide in atmospheric air leads to increasing in the air temperature causing a phenomenon known as a greenhouse effect, where :

- The sun rays penetrate the Earth's atmosphere.
- The Earth absorbs these rays, then reemits the radiation back in the form of thermal radiations.
- Carbon dioxide prevents the penetration of these thermal radiations to the outer space causing the increase of the air temperature which is known as "greenhouse phenomenon".



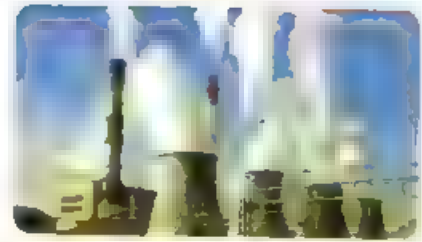
2 Sulphur oxides

- Sulphur oxides are resulted from fuel burning such as .

(A) Sulphur dioxide (SO_2)

(B) Sulphur trioxide (SO_3)

- **Their harms :** They are acidic gases that cause :
 - Respiratory system malfunction (breathing problems).
 - Building corrosion.



3 Nitrogen oxides

- Nitrogen oxides are resulted at the time of lightning.
- **Their harms :** They are poisonous acidic gases that affect the nervous system and the eye.



TRY to answer worksheet

- General Exercise of the School Book on Unit 1
 - Model exams on Unit 1
- in the Notebook

7

Remember



Lesson Three

★ Chemical reaction :

It is the breaking of the existing bonds between the atoms of molecules in the reactants and forming new bonds between the atoms of the molecules in the products.

★ Chemical equation :

It is a set of symbols and chemical formulae representing the reactants and the products molecules in the chemical reaction and it represents the conditions of the reaction as well.

★ The balanced chemical equation :

It is an equation in which the number of atoms entering a reaction equals the number of atoms resulting from this reaction.

★ Law of conservation of matter (mass) :

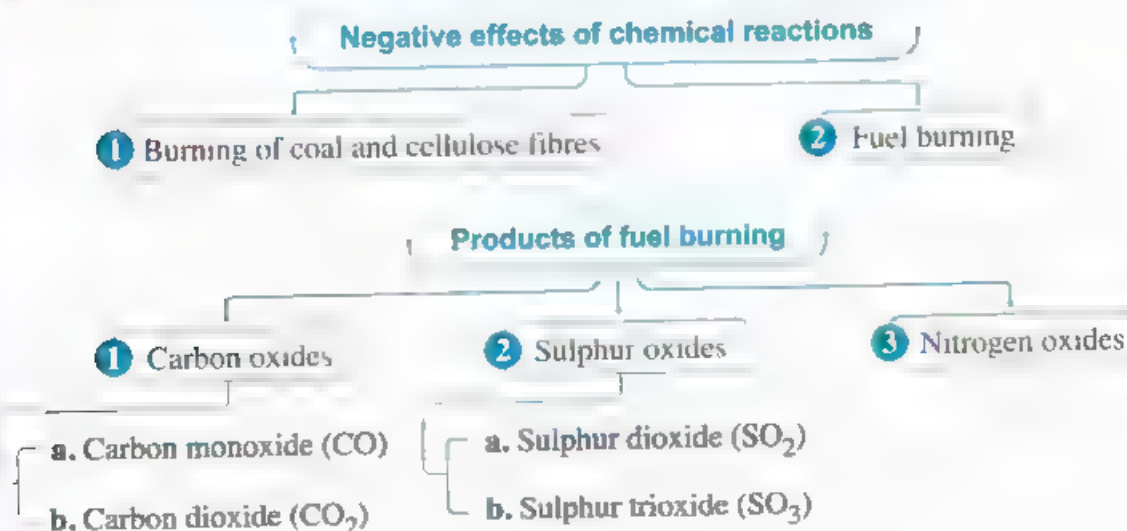
The sum of reactants masses in any chemical reaction equals the sum of products masses.

★ Law of constant ratios :

The chemical compound is formed from the combination of its elements by constant weight ratios.

★ Direct combination reactions :

They are the reactions which involve a combination of two or more substances to form a new compound.



Questions ?

on lesson Three

Remember

Higher skills

School book questions



Interactive Exercises

1. Choose the correct answer :

1. The chemical reaction causes
 - a. breaking the bonds between the products and forming new bonds between the reactants.
 - b. the formation of bonds between the products ,then breaking the bonds between the reactants.
 - c. breaking the bonds between the molecules of reactants and forming new bonds between the molecules of the products.
 - d. breaking the bonds between the products and the reactants.
2. The bright magnesium ribbon changes into a white powder of _____ when it burns in air.
 - a. magnesium nitrite
 - b. magnesium oxide
 - c. magnesium hydroxide
 - d. magnesium dioxide
3. The sum of reactants masses in any chemical reaction is _____ the sum of products masses.
 - a. doubled
 - b. more than
 - c. equal to
 - d. less than
4. On applying the law of constant ratios on the following reaction :



We will find [knowing that : Mg = 24 and O = 16].

- a. each 48 g (Mg) combines with 32 g (O) to form 80 g (MgO).
 - b. each 24 g (Mg) combines with 16 g (O) to form 40 g (MgO).
 - c. each 12 g (Mg) combines with 8 g (O) to form 20 g (MgO).
 - d. (a) , (b) and (c) are correct answers.
5. If the molecule of carbon dioxide consists of one atom of carbon and two atoms of oxygen, knowing that the mass of carbon is 12 and that of oxygen is 16, so the mass of two molecules of carbon dioxide equals gm.
 - a. 22
 - b. 44
 - c. 88
 - d. 33
 6. Which of the following is considered a balanced chemical equation ?
 - a. $\text{Mg} + \text{O}_2 \xrightarrow{\Delta} \text{MgO}$
 - b. $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} \text{MgO}$
 - c. $\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$
 - d. $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$
 7. Direct combination reaction takes place between
 - a. two nonmetals.
 - b. a metal and a nonmetal.
 - c. a compound with another.
 - d. all of the previous answers.

8. Ammonia combines with conc. HCl producing of ammonium chloride.
a. white ppt. b. brown clouds c. white clouds d. brown ppt.
9. The equation verifies the law of conservation of matter.
a. $\text{N}_2 + \text{H}_2 \longrightarrow \text{NH}_3$ b. $\text{NO} + \text{O}_2 \longrightarrow \text{NO}_2$
c. $\text{KCl} + \text{AgNO}_3 \longrightarrow \text{AgCl} + \text{KNO}_3$ d. $\text{H}_2\text{O} \longrightarrow \text{H}_2 + \text{O}_2$
10. Chemical reactions are used in
a. medicines industry. b. fertilizers industry.
c. food industry. d. all of the previous answers.
11. Increasing the ratio of gas in the atmosphere leads to increasing the air temperature
a. carbon monoxide b. carbon dioxide c. nitric oxide d. sulphur dioxide
12. The gases that cause building corrosion are
a. nitrogen oxides b. carbon oxides. c. sulphur oxides. d. both (b) and (c).
13. The gases that affect the nervous system and the eye are
a. nitrogen oxides b. carbon oxides c. sulphur oxides. d. (a) and (b).
14. All of these gases are acidic gases, except
a. sulphur dioxide. b. sulphur trioxide. c. nitrogen oxides. d. ammonia
15. oxides are resulted during the time of lightning.
a. Carbon b. Sulphur c. Nitrogen d. (a) and (b)
16. The substances resulted from burning of coal and cellulose fibres cause
a. headache. b. fainting.
c. lung cancer. d. (a) , (b) and (c) are correct.

2. Choose from column (B) what suits it in column (A) :

1

(A) Type of reaction	(B) Symbolic equation
1. Combination of a metal with a nonmetal.	a. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc.}} \text{NH}_4\text{Cl}$
2. Combination of an element with a compound	b. $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$
3. Combination of a compound with another compound.	c. $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$
4. Combination of a nonmetal with a nonmetal.	d. $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} 2\text{CO}_2$



2	(A) Pollutant	(B) Harms
	1. Carbon dioxide 2. Sulphur oxides 3. Nitrogen oxides 4. Carbon monoxide	a. Building corrosion. b. Nervous system irritation. c. Occurrence of headache and fainting. d. Increasing of air temperature.

3. Put (✓) or (×) in front of the following statements and correct the wrong ones :

- 1 On burning a magnesium strip in the air, a black powder is formed. ()
2. Balancing chemical equation means that the number of atoms of each element is the same in both reactants and products. ()
3. The mass of a molecule of (NO_2) is more than the mass of a molecule of (NO). ()
4. The reaction of magnesium and oxygen is considered a direct combination reaction between two nonmetal elements. ()
5. When ammonia gas reacts with hydrochloric acid, white clouds of ammonium chloride are formed. ()
6. It is possible to convert the chemical energy in some chemical reactions to heat energy or electric energy. ()
7. Sulphur dioxide gas acts as a greenhouse effect. ()
8. By increasing the ratio of (CO_2), the air temperature decreases ()
9. Carbon oxides have bad effects on the nervous system and the eye. ()
10. Sulphur oxides and nitrogen oxides are acidic gases. ()
11. Burning of cigarettes causes lung cancer. ()
12. The burning reactions are considered from the chemical reactions that pollute the environment. ()
13. Nitrogen oxides are formed during occurrence of earthquakes ()

4. Write the scientific term of each of the following :

- 1 Breaking the reactants bonds and forming new ones among the products.
- 2 A set of chemical formulae and symbols expressing the reactants, the products and the reaction conditions.
3. The sum of reactants masses in any chemical reaction equals the sum of products masses.
4. The chemical compound that is formed from combination of its elements by constant weight ratios.
- 5 Reactions which involve combination between an element with another or a compound with another.

- 6. White clouds are formed on placing a glass rod wet with conc. hydrochloric acid close to the mouth of a test tube containing ammonia solution.
- 7. The gas which acts as a greenhouse effect.
- 8. Oxides that cause building corrosion.
- 9. Poisonous gases that affect both the eye and the nervous system.

5. Complete the following statements :

- 1. The chemical reaction is the _____ of the existing bonds between the atoms of the molecules in the reactants and _____ new bonds between the atoms of the molecules in the products.
- 2. In the reaction : $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$
 - (a) The _____ bond in an oxygen molecule is broken to give _____
 - (b) The magnesium atom combines with _____ atom to form _____ molecule.
- 3. The chemical equation is a set of _____ and _____ expressing the reactants and molecules in the chemical reaction.
- 4. The chemical equation should be _____ to achieve the law of _____
- 5. If 48 gm of magnesium combines with 32 gm of oxygen, they produce _____ gm of _____
- 6. A compound is produced from a chemical combination of atoms of two elements or more by constant weight proportions and this is known as the law of _____
- 7. Combination of carbon with oxygen gives _____ gas and this reaction is considered _____ reaction.
- 8. When a glass rod wet with conc. hydrochloric acid is put at the mouth of a test tube containing ammonia solution, _____ clouds of _____ are formed.
- 9. Chemical reactions are used in many industries such as manufacture of _____ , _____ and _____
- 10. _____ and _____ are among products of fuel burning.
- 11. Increasing the ratio of _____ gas in air leads to increasing the air temperature.
- 12. Carbon monoxide is a dangerous gas which causes _____ , _____ and _____
- 13. Sulphur oxides such as _____ and _____ are acidic gases which cause building _____
- 14. The combination of oxygen gas with _____ compound produce _____ gas which is responsible for greenhouse phenomenon.
- 15. Burning of coal and cellulose fibers cause _____ pollution and _____
- 16. _____ oxides affect the nervous system, while _____ oxides cause respiratory system malfunction.
- 17. _____ oxides resulted during the time of lightning and they are from poisonous _____ gases.



6. Complete the following equations and mention the type of each reaction :

1. $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} \dots\dots\dots$ ($\dots\dots\dots$)
2. $\text{C} + \text{O}_2 \xrightarrow{\Delta} \dots\dots\dots$ ($\dots\dots\dots$)
3. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc.}} \dots\dots\dots$ ($\dots\dots\dots$)
4. $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} \dots\dots\dots$ ($\dots\dots\dots$)
5. $2\text{NO} + \text{O}_2 \longrightarrow \dots\dots\dots$ ($\dots\dots\dots$)

7. Give reasons for :

1. A white powder is formed when a magnesium ribbon is burned in air.
2. A chemical equation should be balanced.
3. The mass of magnesium is increased when it is burned.
4. White clouds are formed when conc. hydrochloric acid reacts with ammonia gas
5. Chemical reactions play an important role in our life.
6. The use of chemical reactions is considered a double-edged weapon.
7. Burning of fuel is among the reactions that pollute the environment.
8. (CO_2) gas acts as a greenhouse effect.
9. Smoking is very harmful to health.
10. The spread of cancer tumors increases in the country that use coal as fuel.
11. Burning of coal and cellulose fibers has bad effect.
12. Carbon monoxide is a dangerous gas.
13. Sulphur oxides cause respiratory system malfunction and building corrosion
14. Nitrogen oxides affect the nervous system and the eye.

8. Rewrite the following chemical equations after balancing them :

1. $\text{Al} + \text{Cl}_2 \longrightarrow \text{AlCl}_3$
2. $\text{H}_2 + \text{NO} \longrightarrow \text{H}_2\text{O} + \text{N}_2$
3. $\text{Na} + \text{Cl}_2 \longrightarrow \text{NaCl}$
4. $\text{KI} + \text{Cl}_2 \longrightarrow \text{KCl} + \text{I}_2$
5. $\text{CO} + \text{O}_2 \longrightarrow \text{CO}_2$




9. What is meant by each of the following ... ?

1. Chemical reaction.
2. Chemical equation.
3. The balanced chemical equation
4. Law of conservation of matter (mass).
5. Law of constant ratios.
6. Direct combination reactions.

10. Mention the name of the chemical pollutants that cause the following harms :

1. Lung cancer.
2. Headache, fainting and severe stomach-aches.
3. Respiratory system malfunction and building corrosion.
4. Nervous system irritation and inflammation of the eye.

11. Write the chemical equation representing the following reactions, then indicate the type of each reaction :

1. Heating a magnesium ribbon in air.
2.  Carbon burning in the presence of oxygen.
3.  Hydrochloric acid is combined with ammonia gas.
4.  The reaction between carbon monoxide and oxygen.

12. What happens in each of the following : [Explain your answer with balanced symbolic chemical equations if it is possible] :

1. Burning a magnesium ribbon in air.
2. Approaching a wet rod with hydrochloric acid to ammonia gas.
3. Burning of a piece of coal in air.
4. The percentage of (CO₂) gas increases in air.
5. Burning of coal and cellulose fibers.

13. Mention the harms of :

1. Carbon monoxide.
2. Carbon dioxide.
3. Sulphur oxides.
4. Nitrogen oxides.

14. Indicate using symbolic and word equations, an example for the types of direct combination reaction between :

1. An element with an element.
2. An element with a compound.
3. A compound with another compound.

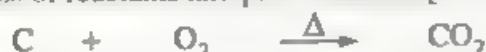
15. Variant questions :

1  Write a short paragraph on :

Burning of fuel and its harmful effects on human beings and environment.

2 Knowing that the mass of carbon (C) is 12 and oxygen (O) is 16 :

Find the total mass of reactants and products through the following reaction :



3 Calculate the masses of reactants and products in the following reactions :



(Knowing that the mass of . H = 1 & O = 16 & S = 32 & Cl = 35.5 and Na = 23)



4 From the opposite reaction : $C + O_2 \xrightarrow{\Delta} CO_2$

- (1) Show how the conservation law of matter is achieved, then define it ?
[knowing that the atomic masses of : C = 12 & O = 16].
- (2) What is the effect of the produced gas on the environment ?
- (3) **What is the type of each of the following ?**
 - a. The produced oxide.
 - b. The chemical bond in the produced molecule.
 - c. The chemical reaction that is occurred.

5 If you have the following substances :

- | | | |
|----------------------------|---------------------|----------|
| - Conc. hydrochloric acid. | - Magnesium ribbon. | |
| - A piece of coal, | - Ammonia. | - Flame. |

Show by balanced chemical equations only how to obtain :

- | | | |
|------------------|---------------------|-------------------|
| (1) Metal oxide. | (2) Nonmetal oxide. | (3) White clouds. |
|------------------|---------------------|-------------------|

6 One of your classmates has asked you to share him writing a report on the role of technology on chemical reactions, indicating their importance and their bad effects on the environment. What is the information you will support him with ?

7 What is the mass of calcium nitrate produced from the reaction of 74 gm of calcium hydroxide with 126 gm of nitric acid ? Knowing that the mass of the formed water is 36 gm according to this equation :



Thinking Skills

Questions

1. Choose the correct answer :

1. To form 54 gm of water, it is required to react 48 gm of oxygen with 6 gm of hydrogen, so 2 gm of hydrogen combines completely with _____ gm of oxygen
a. 12 b. 16 c. 96 d. 144
2. The ratio between the mass of reactants in the chemical reaction to the mass of products is one according to the law of conservation of matter.
a. less than b. more than c. equal to d. no correct answer
3. On burning a magnesium ribbon in air, the weight of the formed white powder is the weight of magnesium ribbon.
a. more than b. less than c. equal to d. no correct answer

2. Give reasons for :

1. Erosion the front of houses in the industrial areas.
2. Country prevents the passage of cars in the archaeological areas
3. Presence in crowded places with cars leads to headache and fainting.

3. In the opposite reaction : $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$

48 gm of magnesium reacts with 32 gm of oxygen to form 80 gm of magnesium oxide.
How many grams of magnesium is required to form 10 gm of magnesium oxide ?

4. Study the following reaction, then answer the following questions :



[knowing that the mass of : Na = 23 , O = 16 , H = 1 , Cl = 35.5].

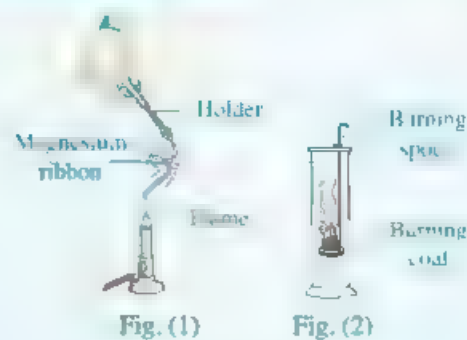
- (1) Choose : The resulting salt from the reaction _____ in water.
a. soluble b. insoluble c. precipitates
- (2) Calculate the mass of sodium chloride resulted from the reaction of 80 gm of sodium hydroxide with a suitable amount of hydrochloric acid.



5. Study the following figures, then answer the following questions :

1. From the opposite two figures, mention :

- The type of the reaction that represents each figure [write the equation].
- The type of the produced compound from the two reactions (1) and (2)
- The properties of magnesium ribbon and the piece of coal [two only].



2. If you put a small amount of ammonia solution in a test tube and approach a glass rod wet with conc. hydrochloric acid to the mouth of the test tube as in the figure :

- What do you observe ?
- Mention the type of the reaction [write the equation].
- What is the name and the type of the produced compound ?



2

Force and Motion

Lesson **1** | Fundamental Forces in Nature

Lesson **2** | Accompanied Forces to Motion

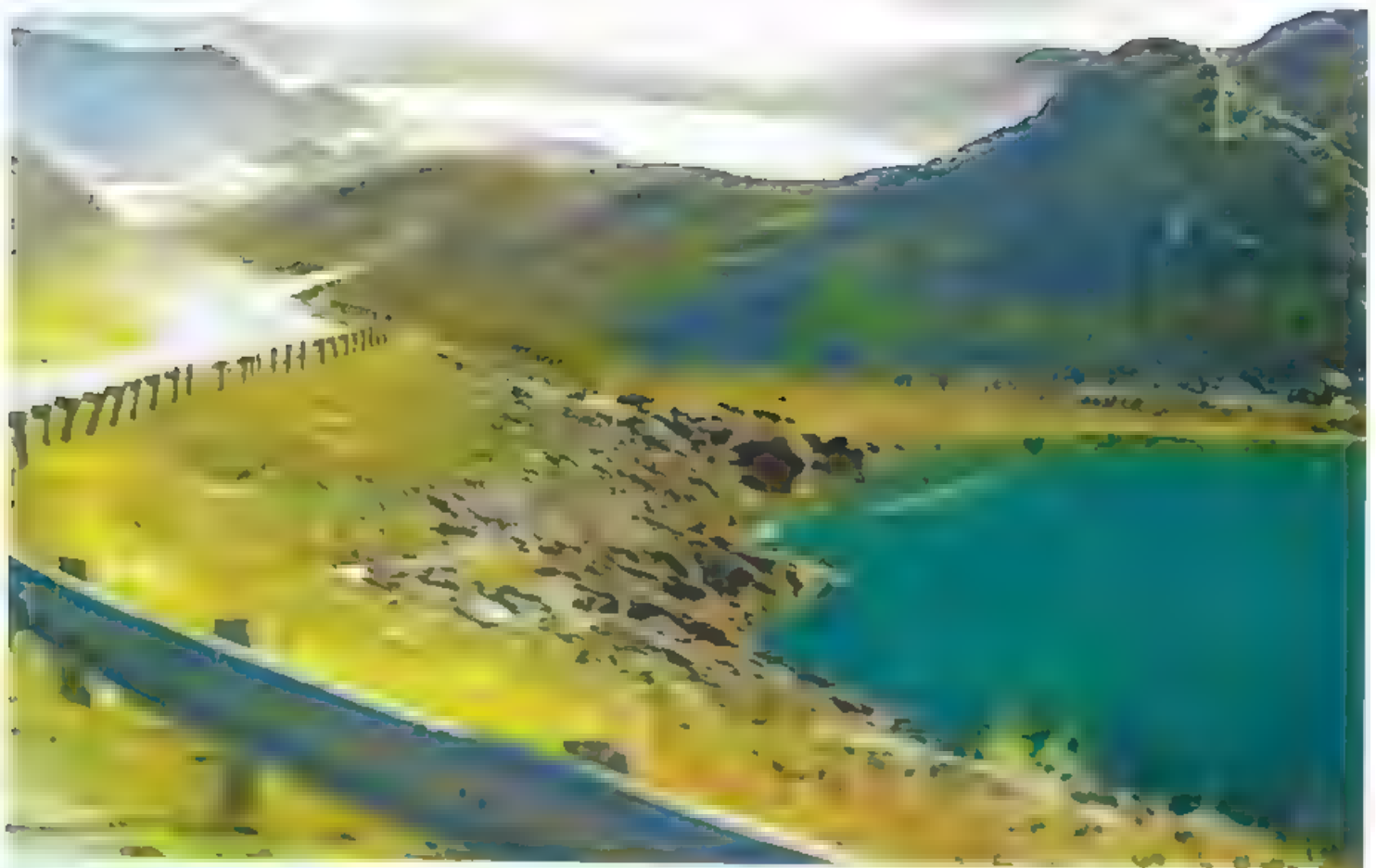
Lesson **3** | Motion.



Unit Objectives :

By the end of this unit, students will be able to :

- Identify the concept of force
- Classify fundamental forces in nature into gravitational, electromagnetic, strong and weak nuclear forces
- Infer the effective factors on the gravitational force between two objects
- Form an electric circuit to make an electromagnet
- Name the forces which affect an object and those resulted from an object mass effect
- Interpret the static and moving objects
- Give life examples of forces that affect living systems



- Describe the periodic motion
 - Identify wave motion
 - Apply logic interpretations of the results of wave motion experiments
 - Give examples of technological applications in wave motion domain
 - Cooperate with his (her) classmates to carry out experiments and deduce concepts
 - Apply the scientific thinking skills to understand and interpret motion phenomena
 - Identify the relative motion to an object relative to another one or a fixed benchmark (frame of reference)
 - Realize greatness of God in ordering the forces controlling the universal phenomena
 - Appreciate scientists' role in interpreting force and motion
-

1

Fundamental Forces in Nature



What is the meaning of force ?

To know the meaning of the force, let's see the following examples :

Examples

- 1 The book on the table remains static as long as no one moves it **G.R.**

Figures



Reasons

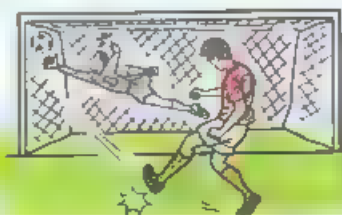
Because there is no force acting on it.

- 2 The wall doesn't move when you push it with your hands **G.R.**



Because the force acting on the object is improper.

- 3 The static ball moves when you kick it with your foot and stops when the goalkeeper catches it **G.R.**



Because the object's state changes from static state to motion state or vice versa when a proper force acts on it.

4. The ball changes its direction when the player delivers it with his head

G.R.



Because the direction of the acting force is in the opposite direction of the movement of the object.

➤ From the previous examples, we can define the force as follows

Force

It is an effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion



The measuring unit of force is **newton (N)**.

What happens when a proper force acts on?

1. A static object.

- The object will move from its position to another position in the same direction of the force acting on it.

2. A moving object in the same direction of its movement.

- The speed of the moving object will increase.

Fundamental forces in nature

There are many different types of forces, these forces cannot be seen in nature but we can feel them in some phenomena, such as :



1. Lightning and thunder.



2. Wind motion.



3. The gravitational of objects to Earth.



4. The attraction of iron to magnet.

Also, there are forces causing technological applications, such as :



1. Generating the electric current.



2. Fire weapons.

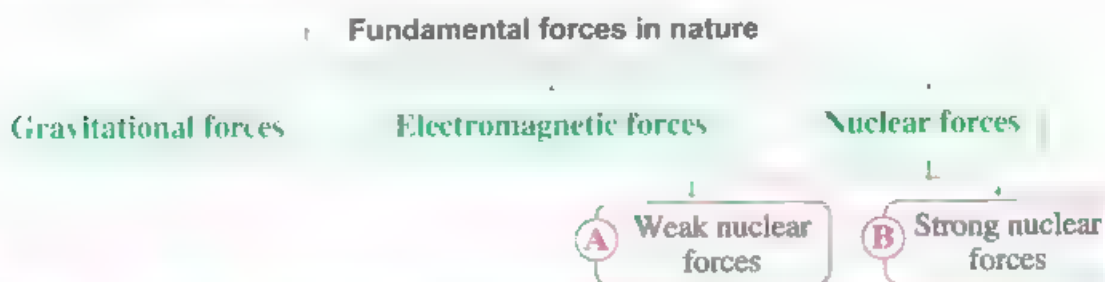


3. Nuclear explosions.



4. Nuclear reactors.

- Although the forces differ, the scientists classified them into three divisions.
The following diagram shows them :



FIRST ▶ Gravitational forces

- Isaac Newton was the first one who discovered the Earth's gravitational force when he was sitting under a tree and he found an apple falling down to the ground.
- Then he proved that, all masses are attracted toward the Earth by a force known as "Earth's gravitational force" and this force depends on the masses of the objects, as shown in the following activity.



Activity

1

- Earth attracts objects :

Steps :

- Put a set of objects that differ in mass (1 kg - 5 kg - 10 kg) on the ground.
- Try to lift the masses and put them on a table beginning with the smallest mass then the next one in order.

Observation :

The exerted work to lift objects increases by increasing the object's mass.

Conclusion :

As the object's mass increases, the work done to lift the object upwards increases in the opposite direction of the Earth's gravitational.

Interpretation :

- Earth attracts the objects to its centre by a force called "Object's weight".
- Object's weight increases by increasing the object's mass and vice versa





Object's weight

It is the ability of the Earth to attract that object to its centre.
or
It is the force of Earth's gravitational to the object.



The measuring unit of the object's weight is **newton (N)**.

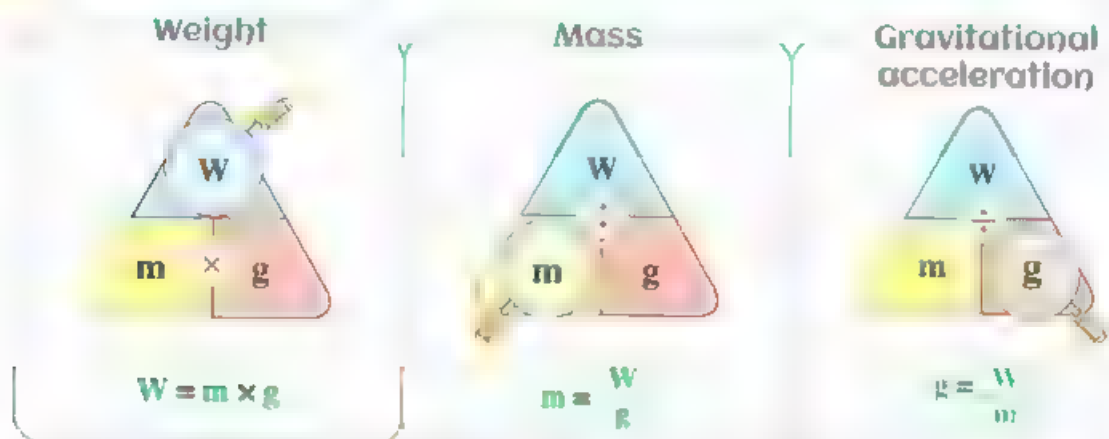
So, the weight of an object can be calculated by using the following relation :

$$\text{Object's weight (W)}_{\text{newton}} = \text{Object's mass (m)}_{\text{«Kg»}} \times \text{Earth's gravitational acceleration (g)}_{\text{«m/sec}^2\text{»}}$$

The Earth's gravitational acceleration = $9.8 \approx 10 \text{ m/sec}^2$.



To calculate the weight, mass and gravitational acceleration :



- From the previous relation, we can conclude that the object's weight depends on ,
1. Object's mass.
 2. Gravitational acceleration.

What is meant by ...?

The weight of an object equals 30 newton.

- This means that the ability of the Earth to attract this object equals 30 newton

Note

The effective point of an object's weight is located at its centre and this is known as **centre of gravity**, so it is said that the Earth attracts the objects towards its centre (its centre of gravity)



Centre of gravity of a spherical body



Problems

- Find the weight of an object of 100 kg mass [knowing that the Earth's gravitational acceleration is 9.8 m/sec^2].**

Solution

$$\begin{aligned}\text{Object's weight} &= \text{Mass} \times \text{Earth's gravitational acceleration} \\ &= 100 \times 9.8 = 980 \text{ N.}\end{aligned}$$

- Calculate the mass of an object if its weight is 280 newton [knowing that the Earth's gravitational acceleration is 10 m/sec^2].**

Solution

$$\begin{aligned}\text{Object's weight} &= \text{Mass} \times \text{Earth's gravitational acceleration} \\ \text{Mass} &= \frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}} = \frac{280}{10} = 28 \text{ kg.}\end{aligned}$$

- A big box has a number of small balls that are similar in mass.**

If you know that :

- The mass of one ball = 0.5 kg.
- The weight of balls = 500 N.
- The Earth's gravitational acceleration = 10 m/sec^2 .

Calculate the number of small balls inside the box.

Solution

$$\begin{aligned}\text{The weight of one ball} &= \text{The mass of one ball} \times \text{Earth's gravitational acceleration} \\ &= 0.5 \times 10 = 5 \text{ N.}\end{aligned}$$

$$\text{Number of balls} = \frac{\text{Weight of balls}}{\text{Weight of one ball}} = \frac{500}{5} = 100 \text{ ball.}$$

- G R.** • **The mass of the object remains constant by changing its position on the Earth's surface.**

Because the mass of the object is the amount of matter that the object contains, and it doesn't change by changing the position.

- **Object's weight changes from one place to another on the Earth's surface.**

Because Earth's gravitational acceleration changes from one place to another.

- **The weight of the object is always more than its mass.**

Because it equals multiplying the mass of the object by Earth's gravitational acceleration

Note


The value of Earth's gravitational acceleration changes according to :

1 Approach or move away from the centre of the Earth

- Earth's gravitational acceleration :

- Decreases by moving away from the Earth's centre.
(on raising up the surface of the Earth).
- Increases by approaching to the Earth's centre
(on getting down towards the surface of the Earth).

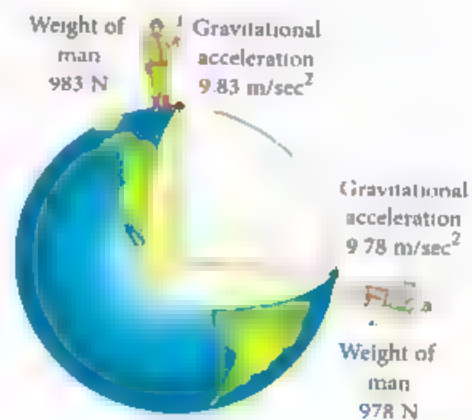
Height	Mass	Weight
200 km	1 kg	9.29 N
100 km	1 kg	9.58 N
Zero	1 kg	9.8 N



The body weight increases by approaching to the centre of the Earth by increasing the Earth's gravitational acceleration and vice versa.

2 Transfer from one place to another on the Earth's surface

- Due to the difference of the distance between the Earth's surface and its centre from one place to another as the Earth is not completely circular, so the distance between the centre of the Earth and any point on Earth's surface at the **two poles** (north and south poles) is **less than** the distance between the centre of the Earth and any point on the Earth's surface at the **equator**.
- So, the Earth's gravitational acceleration at the **two poles** is **more than** that at the **equator**.



The weight of the man, its mass 100 kg at the north pole is **more than** its weight at the equator.

G.R. The weight of the object at the south pole is greater than its weight at the equator.

Because the Earth's gravitational acceleration at the south pole is greater than the Earth's gravitational acceleration at the equator.

SECOND

Electromagnetic Induction



They are the magnetic forces (magnetism) produced by the effect of passing an electric current (the flow of electric charges) through a coil.

Activity

1

- To show the magnetic force of an electric current.
- The idea of how the electromagnet works.



Materials :

- A long isolated copper wire.
- A dry battery (4.5 volts).
- Iron filings.
- A wrought iron bar (or an iron nail).
- An open-ended plastic tube.



Procedures :

1. Coil the wire in a spiral shape around the plastic tube (as shown in the figure).



2. Insert the iron bar (or the iron nail) in the tube.



3. Connect the two ends of the wire to the battery.



4. Approach the iron bar (inside the tube) to the iron filings.



Observation :

The iron bar attracts the iron filings (the iron bar acts as a temporary magnet when the electric current passes through the wire).



Conclusion :

Electric current has a magnetic effect.

Applications on electromagnetic forces

The idea of operation of a lot of devices depends on the electromagnetic forces, such as :



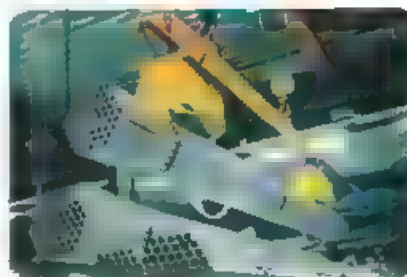
A Electromagnet

➤ Structure :

- It is made up of an insulated copper wire coiling around a bar of wrought iron.

➤ The idea of how it works :

- When the electric current passes through the coil, the wrought iron bar turns into a temporary magnet, and when the electric current is cut off, the wrought iron bar loses its magnetism.



Electromagnet

i.e.

(It changes the electric energy into a magnetic energy).

➤ Uses :

- It is used in making many devices such as :
 - Electric winches (cranes) which lift scrap iron and cars in ports
 - Electric bells.

B Electric generator (The dynamo)



Electric generator

C Electric motor



Electric motor

Idea of operation :

It converts the mechanical (kinetic) energy into an electric energy.

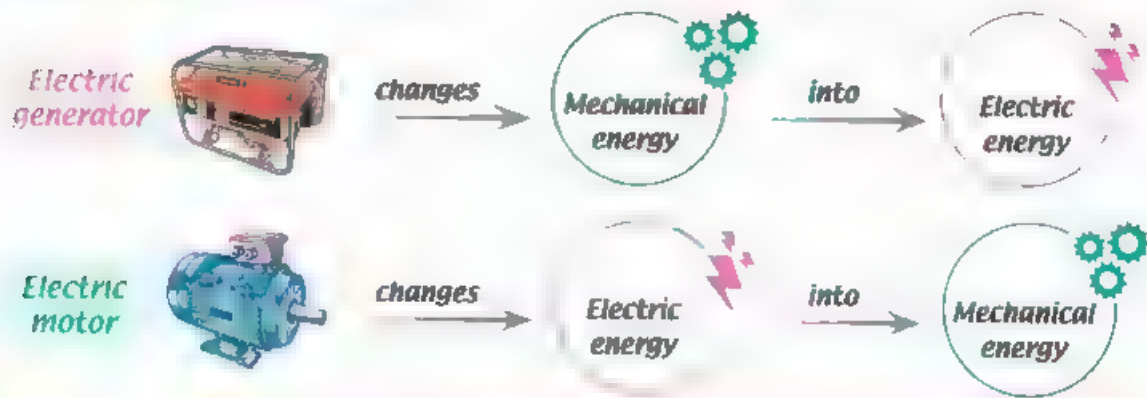
It converts the electric energy into a mechanical energy.

Example :

The dynamo in a bike.

The motor in a fan and a blender (a mixer).

- We can summarize the changes of energy in each of the electric generator and electric motor in the following diagram.



THIRD

Nuclear forces

- Scientists have discovered that the atom stores a massive amount of energy inside its **nucleus**.
- This massive energy is accompanied by forces known as **nuclear forces** which can be divided into two types :

A Weak nuclear forces :

- They are used to get radioactive elements and radiations, which are used in :
 - Medicine.
 - Scientific researches
 - Industry.



B Strong nuclear forces :

- These nuclear forces liberate nuclear energy, which is used in :
 - Producing of electric energy.
 - Military purposes.



Egypt seeks to use nuclear energy in producing electricity besides the other forms of energy

TRY to answer worksheet in the Notebook

9

Remember



Lesson One

- ★ **Force** : It is an effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.

Fundamental forces in nature

Gravitational forces

Electromagnetic forces

Nuclear forces



- ★ **Object's weight** : It is the force of Earth's gravitational to the object.
- ★ **The measuring unit of force and object's weight** is newton (N).
- ★ **The relation used to calculate the weight of an object** :

$$\text{Object's weight (W)} = \text{Object's mass (m)} \times \text{Earth's gravitational acceleration (g)}$$

Applications of electromagnetic forces

A Electromagnet

- It changes the electric energy into a magnetic energy.
- It is used in making many devices, such as :
 - Electric winches.
 - Electric bells.

B Electric generator (the dynamo)

- It changes the mechanical (kinetic) energy into an electric energy

C Electric motor

- It changes the electric energy into a mechanical energy.

Nuclear forces

A Weak nuclear forces :

They are used to get radioactive elements and radiations, which are used in :

- Medicine.
- Scientific researches.
- Industry.

B Strong nuclear forces :

They are used in :

- Producing electricity.
- Military purposes.

Questions ?

On Lesson One

Remember

School book questions



Interactive Exercises

1. Choose the correct answer :

1. When you kick a static ball with your foot, a force acts on the ball which changes the
 - a. direction of the motion of the ball.
 - b. state of the ball into motion.
 - c. mass of the ball.
 - d. (a) and (b).
2. [1.1] A force is an effect that
 - a. always changes the state of an object's motion.
 - b. never changes the state of an object's motion.
 - c. always changes both object's position and direction.
 - d. may change the state of an object's motion.
3. Fundamental forces in nature are
 - a. gravitational forces.
 - b. electromagnetic forces.
 - c. nuclear forces.
 - d. all of the previous forces.
4. The apple falls down due to the effect of
 - a. electromagnetic force.
 - b. Earth's gravitational force.
 - c. weak nuclear force.
 - d. strong nuclear force.
5. [1.2] The amount of Earth's gravitational pull on the object is
 - a. object's mass.
 - b. object's weight.
 - c. Earth's gravitational acceleration.
 - d. centrifugal force.
6. [1.3] is the scientist who discovered the Earth's gravitational
 - a. Planck
 - b. Newton
 - c. Archimedes
 - d. Coulomb
7. The work done to lift an object upwards increases by increasing
 - a. object's volume.
 - b. object's mass.
 - c. object's density.
 - d. no correct answer.
8. [1.4] An object's weight on the Earth's surface is related to the forces
 - a. electromagnetic
 - b. gravitational
 - c. weak nuclear
 - d. strong nuclear
9. If the mass of an object decreases to its half, the weight
 - a. increases to the double.
 - b. decreases to the half.
 - c. still constant.
 - d. no correct answer.
10. [1.5] Earth's gravitational acceleration is changed from a place to another on Earth's surface because of the
 - a. objects' masses.
 - b. Earth's mass.
 - c. distance from the Earth's centre.
 - d. temperatures.



- 11. The multiplying of object's mass by Earth's gravitational acceleration equals
 - a. object's volume. b. object's mass c. object's weight d. no correct answer
- 12. If the mass of an object is 2 kg and the Earth's gravitational acceleration is 10 m/sec^2 , the object's weight equals
 - a. 0.2 newton. b. 2 newton. c. 20 kg. d. 20 newton.
- 13. The weight of an object is measured in
 - a. kilogram. b. coulomb. c. newton. d. m/sec^2 .
- 14. The object's weight changes by changing its
 - a. volume. b. velocity.
 - c. position on Earth's surface. d. (b) and (c) together.
- 15. The bar used in the electromagnet is made up of
 - a. isolated copper. b. steel iron. c. wrought iron. d. aluminium.
- 16. The idea of how the electromagnet works is to change
 - a. mechanical energy into electric energy.
 - b. electric energy into magnetic energy.
 - c. electric energy into mechanical energy.
 - d. magnetic energy into mechanical energy.
- 17. The electromagnet is used in making the
 - a. calculator. b. electric bell
 - c. microscope. d. night vision system.
- 18. Electromagnetic forces affect on the operation of the following, except for
 - a. dynamo (electric generator). b. electric motor.
 - c. car internal combustion engine. d. electromagnet.
- 19. The _____ changes the mechanical energy into an electric energy.
 - a. electromagnet b. dynamo
 - c. electric motor d. no correct answer
- 20. The electric motor changes the
 - a. mechanical energy into an electric energy.
 - b. electric energy into a magnetic energy.
 - c. electric energy into a mechanical energy.
 - d. magnetic energy into a mechanical energy.
- 21. Electric motor is used in the manufacture of
 - a. radio. b. electric bell. c. blender (mixer). d. watch.
- 22. The nuclear radiations used in medicine are produced from
 - a. gravitational forces. b. electromagnetic forces.
 - c. weak nuclear forces. d. strong nuclear forces.




- 23. Weak nuclear forces are used in
 - a. producing electricity.
 - b. scientific researches.
 - c. military purposes.
 - d. all the previous uses.
- 24. We can obtain electric energy from all the following, except
 - a. dynamo.
 - b. electric motor.
 - c. electric power stations.
 - d. strong nuclear reactors.
- 25. Strong nuclear forces are used in
 - a. medicine.
 - b. industry.
 - c. scientific researches.
 - d. military purposes.
- 26. The idea of working the atomic bomb depends on the use of _____ forces
 - a. gravitational
 - b. electromagnetic
 - c. strong nuclear
 - d. weak nuclear

2. Put (✓) or (x) in front of the following statements and correct the wrong ones :

- 1 When a force acts on a moving body, the direction or state of the moving body may change. ()
- 2 You can't push a wall with your hand, because the force acting on it is improper. ()
- 3. Fundamental forces in nature are divided into five main kinds. ()
- 4. Force is an amount of Earth's gravitational to the body. ()
- 5 The exerted work to lift an object decreases by increasing the object's mass. ()
- 6. The Earth's gravitational acceleration increases by approaching to the Earth's centre ()
- 7 The gravitational force of the Earth to the rocket increases as it moves away from it. ()
- 8. The scientist Coulomb who discovered the Earth's gravitational. ()
- 9. The weight of the object changes by changing its place on the Earth's surface ()
- 10. The mass of a person at the equator is less than its mass at the two poles ()
- 11. The gravitational force between an object and the Earth decreases as the mass of the object decreases. ()
- 12. The force is measured in newton. ()
- 13. Object's weight = its mass + gravitational acceleration. ()
- 14. The weight of the object at the north pole is less than its weight at the equator. ()
- 15 The effective point of the object's weight is at its centre of gravity ()
- 16. The electric current has a magnetic effect. ()
- 17. The bar of the electromagnet is made up of copper. ()
- 18. Dynamo changes the heat energy into an electric energy. ()
- 19. Electric generator is used in the manufacture of washing machines ()
- 20. Strong nuclear forces are used in generating solar energy. ()
- 21. Egypt seeks to use nuclear energy in producing medicine. ()

3 Write the scientific term of each of the following :

- 1. The effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the motion direction.
- 2. • The ability of the Earth to attract an object to its centre.
 -  The amount of Earth's gravitational pull on an object.
- 3. The effective point of the object's weight.
- 4. The measuring unit of the object's weight.
- 5. The product of multiplying object's mass by Earth's gravitational acceleration.
- 6. • An instrument used in making the electric winches and electric bells.
 - An instrument used to change the electric energy into a magnetic energy.
- 7. An instrument used to change the mechanical energy into an electric energy
- 8. An instrument used to change the electric energy into a mechanical energy.
- 9. Forces which are responsible for getting radioactive elements and nuclear radiations

4. Complete the following statements :

- 1. The book on the table remains static because there is no _____ acting on it.
- 2. When you kick a static ball by your foot, a _____ acts on it causing its _____.
- 3. Force can change the _____ of motion of an object.
- 4. Force is an effect attempts to change the object's state from being static to _____ or vice versa or attempts to change the _____ of motion.
- 5. Fundamental forces in nature are divided into three divisions, which are _____ forces, _____ forces and _____ forces.
- 6. The work done to lift an object _____ by increasing the object's mass.
- 7. Earth attracts the object to its _____ by a force known as the object's _____.
- 8. The effective point of an object's _____ is located at its centre and this is known as _____.
- 9. When an object transfers from the equator to the north pole, _____ is changed, while _____ remains fixed.
- 10. _____ and _____ are the factors affecting the gravitational force between the Earth and the object.
- 11. The measuring unit of the object's mass is _____, while that of its weight is _____.
- 12. The _____ of an object is fixed value, while its weight _____ from one place to another on the Earth's surface.
- 13. Object's weight = Earth's gravitational acceleration \times _____.
- 14. The weight of an object is measured in _____.



- 15 The object's weight increases as the height from Earth's centre
16. If you know that the Earth's gravitational acceleration is 10 m/sec^2 , the weight of an object of 3 kg mass is
- 17 The electromagnet is made up of an isolated wire coiling around a bar of
- 18 Electromagnet is made by the idea of changing energy into energy
- 19. Electromagnet is used in making and
- 20 Electric generator works on changing energy into energy.
- 21. Electric motor works on changing energy into energy.
- 22. An atom stores a massive amount of energy inside its
- 23. Radioactive elements and nuclear radiations are used in and industry.
- 24. Strong nuclear forces are used in producing and in purposes.
- 25. Egypt seeks to use energy in producing electricity.

5. Give reasons for :

1. The pencil is still in a static state on the desk.
2. The static ball moves when you kick it.
3. When you push a wall, it doesn't move
- 4 The mass of the object remains constant by changing its position on the Earth's surface
5. The weight of a bag of sugar equals 1 kg, this phrase is scientifically not accurate.
6. The weight of the object is always greater than its mass.
7. An object's weight is changed from place to another on the Earth's surface.
- 8 Gravitational acceleration changed on Earth's surface from place to another.
9. The weight of the object at the south pole is greater than its weight at the equator.
10. The wrought iron attracts iron filings after putting it inside an electric coil.
- 11 The importance of dynamo in the case of cutting off the electric current.
12. Electric motor is used in the manufacture of the fans and the washing machines
13. The importance of nuclear force.

6. What is meant by ... ?

- 1. Force.
- 2. Weight.
- 3. An object's weight is 60 N.
- 4 The weight of an object, its mass 1 kg in a certain region on the Earth's surface is 9.8 newton.

7. What is the force responsible for each of the following ... ?

1. Falling of objects towards the Earth's surface.
2. Converting the mechanical energy into an electric energy.
3. Lifting the scrap iron in factories by the electric winches.
4. The emission of some invisible radiations from radioactive elements.
5. Producing electricity from nuclear energy.

8. Explain the idea of operation of each of the following :

1. Electromagnet.
2. Electric generator (Dynamo).
3. Electric motor.

9. Mention one benefit (use) of each of the following :

1. Electromagnet.
2. Electric winches.
3. Electric motor.
4. Weak nuclear force.
5. Strong nuclear force.

10. What happens when ... and why ?

1. You kick a static ball with your foot.
2. A player hits the moving ball with his head.
3. You push a wall with your hand.
4. The object's mass increases (relative to the object's weight).
5. Migration of a bird from the south pole to the equator (related to the mass and the weight of the bird).
6. Approaching from Earth's centre (related to the Earth's gravitational acceleration).
7. Moving away from the centre of the Earth (according to : the mass and the weight of an object).
8. An astronaut moves from the Earth to the Moon (according to , the mass and the weight of the astronaut).
9. An electric current flows through an isolated copper wire which is coiled spirally around a plastic tube containing iron bar and approach it to iron filings.
10. Cutting off an electric current for an electromagnet lifts pieces of iron

11. Choose the odd word out, then write the scientific name of the rest :

1. Gravitational forces / Friction forces / Nuclear forces / Electromagnetic forces.
2. Work / Mass / Weight / Earth's gravitational acceleration.
3. Electric generator / Electric motor / Electric bell / Handbell.

12. Compare between :

1. Mass and weight
2. Electric generator and electric motor.
3. Strong nuclear forces and weak nuclear forces [Concerning the use].

13. Problems :

1. If the Earth's gravitational acceleration in a place is 9.8 m/sec^2 , find the weight of the following :
 - a. 0.3 kg mass ball.
 - b. 50 kg mass boy.
2. Calculate the mass of an object if its weight is 980 newton and the Earth's gravitational acceleration is 9.8 m/sec^2 .
3. An object is put near the Earth's surface and the Earth's gravitational force is 34.3 newton. Calculate :
 - a. The object's weight.
 - b. The object's mass. (knowing that the Earth's gravitational acceleration = 9.8 m/sec^2).
4. The weight of an object on Mars is 32 newton and on Earth is 80 newton. What's the gravitational acceleration on Mars if the gravitational acceleration on Earth is 10 m/sec^2 ?

14. Various questions :

1. Mention three phenomena caused by the effect of the fundamental forces in nature.
2. Mention the main three divisions of forces in nature.
3. Mention the factors affecting the object's weight.
4. Mention the mathematical relationship that links between the weight and mass
5. If you know that the weight of an object at the equator is less than that its weight at the south pole.
 - Mention the relation between each of the following.
 - (1) The mass of the object at the south pole and its mass at the equator.
 - (2) The Earth's gravitational acceleration at the equator and the south pole.
6. Explain the structure of an electromagnet, and mention its uses
7. Mention one example for an apparatus depends on electromagnetic force in its working.
8. Mention the uses of nuclear forces (weak and strong).
9. In the opposite figure, some paper clips are attracted to the nail.
Explain the reason for this attraction.

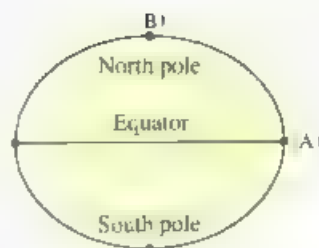


10 **1.1** What is the input energy and output energy in the following devices ?

- (1) Electric motor.
- (2) Electric generator.

11 From the opposite figure, answer the following questions :

- (1) Why is the weight of objects different at the equator from its weight at the two poles ?
- (2) What happens to the weight of an object when it transfers from point (A) to point (B) ? **[Give a reason]**



Thinking Skills

Questions

1. Choose :

- The ratio between the mass of an object at two poles to its mass at the equator is one.
 a. more than b. less than c. equal to
- If you have two objects (A) & (B), the weight of object (A) is doubled the weight of object (B) and the mass of object (B) equals 4 kg, so the weight of object (A) = newton.
 [knowing that the Earth's gravitational acceleration = 10 m/sec^2].
 a. 20 b. 40 c. 80

2. Problems :

- If you have two objects (A) & (B), the mass of object (A) is doubled the mass of object (B) and the weight of object (B) equals 400 newton. Calculate the mass of object (A).
 [knowing that the Earth's gravitational acceleration = 10 m/sec^2].
- An object, whose weight is 36 newton on Earth's surface and 6 newton on Moon's surface. Calculate the ratio between the gravitational acceleration on the surface of the Moon and Earth.
- An object, whose mass is 30 kg on the surface of the Moon. Calculate its weight on :
 (1) Earth's surface. (2) Moon's surface.
 [knowing that the gravity of Moon equals $\frac{1}{6}$ the gravity of Earth and Earth's gravitational acceleration = 9.8 m/sec^2].
- Calculate the gravitational acceleration on the surface of Uranus planet if the weight of an object in there equals 200 newton and its mass on Earth's surface equals 26 kg.
- A 100 kg rocket was shot vertically upward, the rocket hit a target and lost three quarters of its mass and fell to the ground. Compare between the weight of the rocket before and after shooting.
 [knowing that the Earth's gravitational acceleration = 10 m/sec^2].

2

Accompanied Forces to Motion



What are the types of the accompanied forces to motion ?

There are many accompanied forces to motion of objects, the following diagram shows some of them



Accompanied forces to motion

Forces originate due to motion

Forces cause motion

Forces of inertia

Friction forces

Forces inside living systems

FIRST

Forces of inertia

When forces act on objects, which are at rest or moving at a constant speed, these objects resist changes in their motion because of their **inertia**.

Inertia

It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.

➡ The following activities show the meaning of inertia practically :

Activity

1

• To show that objects resist change in the state of motion :



Procedures :

1. Carry some small plastic cubes on your palm and stretch your arm forward.
2. Walk forward fast and suddenly stop at once.



Observation :

The plastic cubes move forward and fall on the ground.



Explanation :

The cubes resist the sudden stopping of the palm of your hand due to inertia, so they continue in the state of motion and fall on the ground.

(The cubes move at the same speed of the person who carries them).



Conclusion :

Force of inertia makes objects resist the change of their motion.

Activity

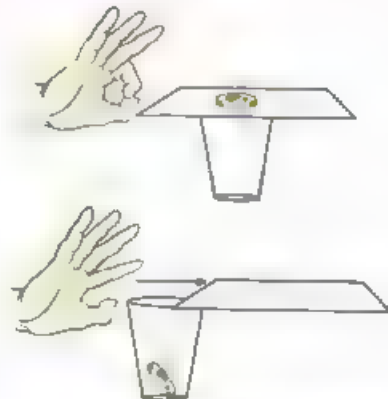
2

• To show that objects resist change of rest state :



Procedures :

1. Place a piece of construction paper on the top of a glass cup and put a coin on it.
2. Use your forefinger to deliver a quick hit to the paper.



Observation :

The coin falls inside the cup.



Explanation :

The coin resists the sudden movement of the paper due to inertia, so it remains static and it falls in the cup.



Conclusion :

Force of inertia makes objects resist the change of their rest state.

Examples indicating inertia in our life :

- 1 The passengers and the driver in a moving bus or car (vehicle) are rushed forward when the bus or car stops suddenly **G.R.**

Due to inertia for the passengers and driver, it makes them resist the sudden stopping of the vehicle to maintain the state of motion, so they rush (force) forward.



- 2 The passengers and the driver in a static bus or car (vehicle) are rushed back when the vehicle starts moving forward after it was at rest **G.R.**

Due to inertia for the passengers and driver, it makes them resist the sudden motion of the vehicle to maintain the state of rest, so they rush back.



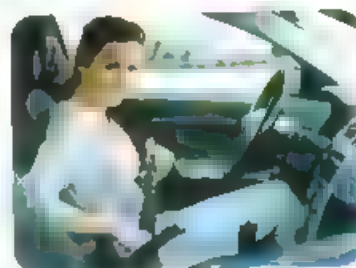
- 3 A football player rushes forward and falls on the ground if he is tripped during running **G.R.**

Due to inertia for the football player that makes him resist the sudden stopping of his foot to maintain his state of motion, so he will be forced forward and fall down.



G.R. Policemen advise drivers to use safety belts in cars.

Because safety belts work on stopping the forces of inertia to prevent the driver and passengers from being injured when a sudden change in motion occurs.



TRY to answer
worksheet
in the Notebook

10



Exercise

Complete :

1. Passengers and the driver in a moving car are once the car suddenly stops due to the
2. Passengers are once the vehicle starts moving forward after it was at rest.
3. If a football player is tripped during running forward, he will be and on the ground.

Answer

1. rushed forward - inertia.
2. rushed back
3. rushed forward - fall down

SECOND



During the motion of an object, friction occurs between the object and the surrounding medium which generates a force known as **friction forces** against the motion of the object and resist its motion.

Friction forces .

They are resistant forces (against motion) originated between the object in motion and the medium touching it.



* The surrounding medium may be :

- A gaseous medium as **air**.
- A liquid surface as **water**.
- A solid surface as the **ground**.

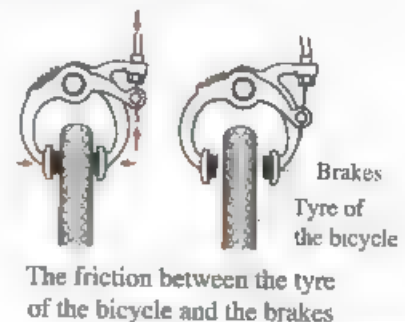
* The relation between the **friction forces** and the **speed of the object** is **inverse** relationship.

«By increasing the friction forces, the speed of the object decreases».

G.R.

Once you use the brakes of a moving bicycle, its speed decreases gradually until it stops.

Because the friction between the tyre of the bicycle and the brakes generates a friction force against motion of the bicycle which leads to resist it.



- ➔ There are benefits and harms of friction forces,
we study them in the following diagram :



Benefits of friction

1. It prevents feet from slipping on roads during walking.
2. It helps in stopping and starting cars motion.
3. It helps in burning match.

G.R. Car tyres are covered with a very coarse substance.

To increase friction between tyres and the road to help car in starting motion and stopping.



Harms of friction

1. It causes a great loss of mechanical energy because this energy is changed into heat energy.
2. It produces heat energy due to friction between some parts of the machines. This heat causes expansion of these parts and affects their performance.
3. It causes the erosion of machines parts and damage them as well.

G.R. Lubricating and oiling mechanical machines.

To reduce friction between moving parts of machines and prevent their erosion.



THIRD

Forces inside living systems (biological forces)

There are forces inside living systems (living organisms) whether

Simple systems such as
uni-cellular living organisms

Or

Complex systems such as
multi-cellular living organisms

These forces enable living organisms to do their different biological operations and keep their survival and vitality.

Biological forces

They are forces inside living systems that enable living organisms to do their different biological operations.



Examples of forces inside living systems :

Heart muscle contraction and relaxation helps the heart to pump blood all over the body organs and vice versa. [This is indicated by heart pulses during the movement of blood inside blood vessels].



Blood circulation

G.R. Blood is pumped all over the body organs.

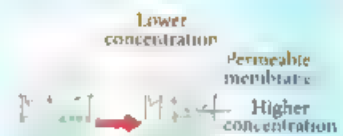
Due to heart muscle contraction and relaxation.

Note : The role of the heart in raising blood from bottom (lower parts) to top is similar to the role of water pump in raising water from canals and groundwater wells against the Earth's gravity.



Water pump

Liquids are transported through pores and the walls of cells from the **lower concentration** to the **higher one**.



Liquids transport through pores

Rising of water and salts from the soil to plant [from root to stem, then leaves] against Earth's gravity force.



The contraction and relaxation of muscles help the body organs to move.



TRY to answer
worksheets
in the Notebook

11 to 12



Accompanied forces to motion

Forces originate due to motion

Inertia

Definition :

It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.

Friction forces

Definition :

They are resistant forces (against motion) originated between the object in motion and the medium touching it.

Forces cause motion

Forces inside living systems

Definition :

They are forces inside living systems that enable living organisms to do their different biological operations.

★ Benefits of friction :

1. It prevents feet from slipping on roads during walking.
2. It helps in stopping and starting cars motion.
3. It helps in burning of match.

★ Harms of friction :

1. It causes a great loss of mechanical energy.
2. It produces heat energy due to the friction between some parts of the machines.
This heat causes expansion of these parts and affects their performance.
3. It causes the erosion of machines parts and damage them as well.

★ Examples of forces inside living systems :

1. Heart muscle contraction and relaxation.
2. Liquids are transported through pores and the walls of cells from the lower concentration to the higher one.
3. Rising of water and salts from the soil to the plant.
4. The contraction and relaxation of muscles.

Questions ?

Lesson Two

Remember

Score


School book questions



Interactive Exercises

1. Choose the correct answer :

1. All of the following are accompanied forces to motion, except
 - a. friction force.
 - b. gravitational force.
 - c. force of inertia.
 - d. forces inside living systems.
 2. The inertia force affects the objects.
 - a. moving
 - b. static
 - c. moving and static
 - d. no correct answer
 3. The coin falls in the cup by a rapid hitting of the paper is an application of
 - a. force of inertia.
 - b. friction force
 - c. gravitational force.
 - d. centrifugal force.
-
4. When a moving bus stops suddenly, the passengers and the driver
 - a. rush backward.
 - b. rush forward.
 - c. turn upside down.
 - d. tend to lean.
 5. When the horse is tripped, the horse rider is suddenly rushed forward, this is related to the force of
 - a. inertia.
 - b. centrifugal.
 - c. attraction.
 - d. horse pushing.
 6. Passengers are rushed back when a car starts moving suddenly, this is related to
 - a. centrifugal force.
 - b. force of gravitational.
 - c. force of inertia.
 - d. friction force.
 7. All of the following are examples of inertia, except
 - a. once the car starts moving forward, the passengers are rushed back.
 - b. passengers are rushed forward if the moving car stops suddenly.
 - c. if a football player is tripped during running forward, he will be rushed forward
 - d. the attraction of bodies to the Earth.
 8. is a technological application on inertia forces.
 - a. Car tyres
 - b. Contraction and relaxation of muscles
 - c. Safety belts
 - d. No correct answer
 9. Electric fan still works for few seconds after cutting the electric current due to force.
 - a. electromagnetic
 - b. gravitational
 - c. inertia
 - d. friction
 10. Friction is always
 - a. in the same direction of motion.
 - b. against motion.
 - c. perpendicular to the motion.
 - d. parallel to the motion in any direction.

- 11.  The car brake performance is an application of
 - a. gravitational forces.
 - b. friction forces.
 - c. centrifugal forces.
 - d. forces of inertia.
- 12. The following forces and operations are applications of friction, except
 - a. walking on the road
 - b. car motion due to rotation of its wheels.
 - c. operation of dynamo (electric generator).
 - d. stopping the car using the brakes.
- 13. When using the bicycle brakes,
 - a. the speed of the bicycle decreases.
 - b. the friction force decreases.
 - c. the centrifugal force increases
 - d. the force of inertia decreases.
- 14. Friction causes a great loss of mechanical energy because this energy is changed into energy.
 - a. light
 - b. electric
 - c. heat
 - d. magnetic
- 15. The idea of machines lubrication depends on the decrease in
 - a. their weights.
 - b. forces of inertia.
 - c. friction forces
 - d. forces of gravity.
- 16. Car tyres are covered with a very coarse substance to
 - a. reduce the friction with the road.
 - b. reduce the air resistance.
 - c. increase the attraction of wheels to road.
 - d. increase the friction with the road.
- 17. In which of the following examples, friction has a harmful effect ?
 - a. Burning a match.
 - b. Preventing feet from slipping during walking.
 - c. Using brakes.
 - d. Rising the temperature of mechanical machine parts.
- 18. enable living organisms to do their different biological operations.
 - a. Forces of inertia
 - b. Friction forces
 - c. Centrifugal forces
 - d. Forces inside living systems
- 19. From the examples of forces inside living systems is/are
 - a. pulse inside blood vessels.
 - b. inertia.
 - c. brakes.
 - d. all the previous answers.
- 20. The heart muscle contraction and relaxation are inferred from
 - a. inhalation and exhalation processes.
 - b. the pulse inside blood vessels.
 - c. the movement of food in digestive system.
 - d. no correct answer.
- 21. Liquids transport through pores and the walls of cells from
 - a. outside to inside.
 - b. inside to outside.
 - c. low concentration to high concentration
 - d. high concentration to low concentration
- 22. Water transports from soil to leaves of plant by the effect of
 - a. gravitational forces.
 - b. biological forces.
 - c. forces of inertia.
 - d. friction forces.



2. Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Stopping the bicycle after using brakes	a. due to force of inertia.
2. Contraction and relaxation of muscles	b. is one of the forces inside the living systems.
3. A football player is rushed forward and falls if he is tripped during running	c. due to force of gravitational.
	d. due to friction.

3. Put (✓) or (x) in front of the following statements and correct the wrong ones :

1. When the speed of a car is 50 km/hour, the speed of the driver is zero. ()
2. Passengers are rushed backward when a car stops suddenly. ()
- 3. Friction is a property of an object has to resist the change of its state. ()
- 4. Safety belts in cars work on increasing the forces of inertia. ()
- 5. Slowing down of a moving bicycle on a road by brakes is due to its inertia. ()
- 6. Friction always opposes motion. ()
- 7. Friction prevents feet from slipping on roads during walking. ()
- 8. Friction causes a great loss of electric energy because this energy is changed into heat energy. ()
- 9. Car tyres are covered with a very smooth substance to increase the friction with roads. ()
10. Lubricants and oils have no effect on friction. ()
11. Friction may occur between the surface of a solid object and air ()
- 12. Car brakes are from applications on friction forces. ()
- 13. There are forces inside living systems including single-cellular organisms. ()
- 14. Heart muscle contraction and relaxation is one of the forces inside living systems. ()
- 15. There are forces inside amoeba to keep its survival. ()
- 16. Contraction and relaxation of body muscles help in moving. ()
- 17. Liquids transport through pores and the walls of cells from the higher concentration to the lower one. ()

4. Write the scientific term of each of the following :

- 1. It is a property of an object has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.
- 2. A technological application is used in cars and planes to stop the forces of inertia when a sudden change in motion occurs.
- 3. Resistant forces (against motion) originated between the object in motion and the medium touching it.
- 4. Forces help in moving and stopping car and bus.
- 5. Forces that help living organisms to do their biological operations.

5. Complete the following statements :

- 1. and are among the accompanied forces to motion.
- 2 Passengers and the driver in a moving car are once the car suddenly stops due to the
- 3 Passengers are once the vehicle starts moving forward after it was at rest.
- 4. If a football player is tripped during running forward, he will be and on the ground.
- 5. Any object inside a moving bus has the same of the bus so, when the bus stops suddenly, objects fall on the ground due to the force of
- 6. Policemen advise drivers using in cars and planes, as they act on stopping the forces of
- 7. forces are resistant forces originated between a moving object and the medium touching it.
- 8. force prevents feet from slipping on roads during
- 9 Friction causes a great loss of energy because this energy is changed into energy.
- 10. Lubricating and oiling mechanical machines reduce the between moving parts and prevent their
- 11. and are from the benefits of friction.
- 12 The uni-cellular organisms are from living systems, while multi-cellular organisms are from living systems.
- 13. Heart muscle and help heart to pump blood all over the body.
- 14 Liquids transport through the walls of the cells from the concentration to the concentration.
- 15. The contraction and of muscles help the body organs to

6. Give reasons for :

- 1 The car passengers are rushed forward when the moving car stops suddenly.
- 2 The car passengers are rushed backward when the car moves suddenly.
- 3 The football player is rushed forward and falls if he is tripped during running forward.
- 4. Policemen advise drivers to use safety belts in cars and planes.
- 5. The fan is going to turn after the electric current goes off.
- 6. Once you use the brakes of a moving bicycle, its speed decreases gradually until it stops.
- 7. Cars that travel on snow have to carry chains that fit around the tyres.
- 8. When you drive a car in a city traffic for sometime, the brakes become hot.
- 9. You can walk easily on grass than that on ice.



10. Car tyres are covered with a very coarse substance.
11. • Spare parts of cars are covered with grease.
• Lubricating and oiling mechanical machines.
12. The match is ignited when it is rubbed with a rough surface.
13. The presence of oil stains on highways is very dangerous.
14. Friction forces are double edged weapon.
15. Blood is pumped all over the body organs.

7. What is meant by ...?

1.  Inertia.
2. Friction.
3. Forces inside living systems.


8. What is the force responsible for each of the following ... ?

1. Falling the coin inside the cup on pulling the paper placed on the top of a glass cup quickly.
2. Ease of the movement on asphalt and difficulty on the gravel.
3. Pulse inside the blood vessels.
4. The rise of water and salts from the soil to the leaves of plant.

9. What happens when ...?

1. A moving bus stops suddenly (concerning the driver and the passengers).
2. A car at rest and suddenly moves forward (concerning the driver and the passengers).
3. You hit quickly a paper placed over a glass cup and a coin placed over the paper.
4. The passengers don't use the safety belts in cars.
5. You ride a bike along a flat road, then you use brakes.
6. Mechanical machines are not lubricated.
7. Friction occurs between two objects (concerning their temperatures).
8. Contraction and relaxation of body muscles.
- 9 Stopping the movement of a heart muscle (concerning the pulse inside the blood vessels).

10. Various questions :

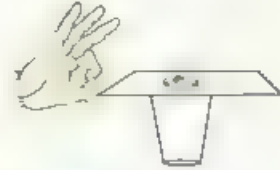
- 1 Mention two examples indicating inertia in our life.
- 2 Show by an activity the concept of inertia.
- 3  Name three benefits and three harms of friction forces.
- 4 Mention one application for each of the following :
 - (1) Inertia.
 - (2) Useful friction forces.
 - (3) Harmful friction forces.

- 5 Why do you slip when you walk on a wet land ? And why this doesn't happen when the land is dry ?

(Describe what happens in both cases).

- 6 Mention three examples of forces inside living organisms.

- 7 **From the opposite figure** . Mention the reason for falling the metallic coin in the cup when pushing the paper quickly.
What do you conclude from that ?

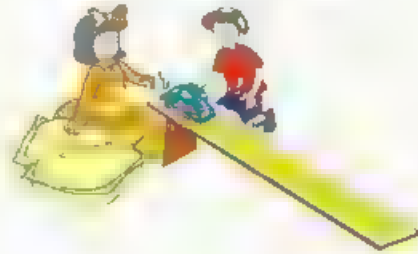


- 8 Adel and Dina draw a horizontal line at the top of a wooden inclined plane as shown in the figure.

Adel put his car at the drawn line and left it to move, the car travels 216 cm. When Dina does the same procedure, her car travels 242 cm.

Answer the following :

- (1) In which car, friction is larger ?
- (2) Why do both cars stop ?
- (3) If Dina puts some sand on the inclined plane and leaves her car to travel along it. On which plane does the car travel more slowly ? Why ?



Thinking Skills

Questions

1. Choose the correct answer :

1. Figure _____ represents the relation between the friction forces and the speed of the object.

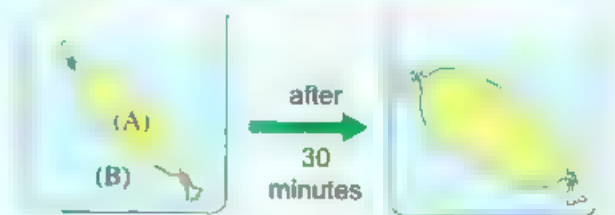


2. The friction force is less than the force that causes movement in case of
- putting a ladder based on a wall.
 - using the brakes of a bike.
 - walking along the way.
 - all the previous answers.

2. Give reasons for :

- It is difficult to pull the boat on the sand of beach and easily in water
- Rising the temperature of the outer surface of the spaceship body during landing in the Earth's atmosphere.
- Continuous pouring water on the tyre of lathe toothed during cutting metals.

3. A part of a chicken intestine is filled with unknown concentration solution and put in a basin filled with another unknown concentration solution, after 30 minutes the intestine is inflated. Answer the following questions :

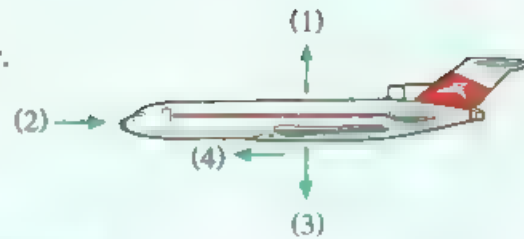


- The concentration of solution (A) is that of (B).
 - more than
 - equal to
 - less than
- Which of the two solutions has a concentration 10% and which one has 40% ? Give a reason.
- What are you expected to happen to the intestine when transferred to a solution, its concentration is 70% ?
- What are the forces that cause this ?

4. Choose the correct answer :

The opposite figure shows a plane flying in the air.

Which of the following choices explain the directions of Earth's gravitational force and the friction force with air ?



Choices	Earth's gravitational force	Friction force with air
(A)	(3)	(1)
(B)	(4)	(2)
(C)	(3)	(2)
(D)	(3)	(1)

3

Motion



What is meant by motion and its types ?

Motion is a change in position of an object over time relative to a reference point.



In this lesson, we will study :

Motion

Relative motion concept

Types of motion

Motion

- Motion happens all around us. Everyday, we see objects such as cars and motor bikes move in different directions at different **speeds**.
- When the object's position changes as time passes according to the position of another object, we can say that the object is in a state of motion.

Speed

It is the distance covered by an object in a unit time.

- The measuring unit of speed is **m/sec** or **km/hr**.
- The measuring unit of distance is **metre (m)** or **kilometer (km)**.

What is meant by ...?


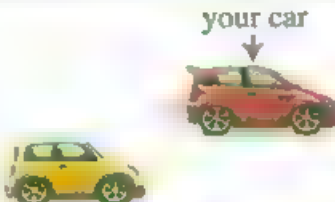


The speed of an object is 20 m/sec.

- ☞ This means that the object covers a distance of 20 m in one second.

Relative motion concept

- To know the meaning of relative motion, let us study the following applications.

Application on relative motion in our life

Applications	Explaining figures	Observations
1. If you are in a moving car and another car moves beside you in the same direction at the same speed		You will imagine that the two cars stop moving and no motion will be observed.
2. • If your car moves beside a stopping car. or • Your car moves at a higher speed and in the same direction of another car.		You will imagine that the other car goes backward (moves in the opposite direction)
3. If you are in a stopping car and another car moves forward beside you.		You will imagine that your car moves backward.
4. If your car moves in an opposite direction to another car that moves at low speed.		You will imagine that the other car moves at a high speed.

- ☞ From the previous applications, we can conclude that:

Relative motion

It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference

The reference point

It is a fixed point used to determine the object's position or to describe its movement.

Types of motion

The motion of objects is divided into **two types** :

A Transitional motion

Transitional motion

It is the motion in which the object's position is changed relative to a fixed point (or a fixed frame of reference) from time to time between initial and final positions.



Examples :

1. A person's motion.



2. A bicycle motion.



3. A train (or car) motion.



B Periodic motion

Periodic motion

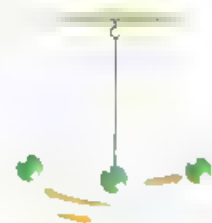
It is a motion which is regularly repeated at equal periods of time.



Examples :

1. A vibrating motion :

As the motion of the simple pendulum.



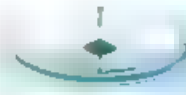
2. A circular motion :

As the movement of the Moon around the Earth.



3. A wave motion :

As the motion of water waves [produced after throwing a stone (or a cork piece) in water].



G.R. The movement of the fan arms is a periodic motion.

Because it is regularly repeated in equal periods of time.

TRY to answer worksheet
in the Notebook

13

Now, we will study the **wave motion** as an example of periodic motion in details .

Wave motion

The waves causing wave motion are divided into two types

A Mechanical waves

Mechanical waves

They are waves that need a medium to transfer through.

Their characteristics :

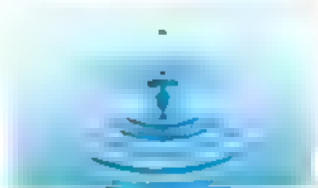
- 1- They are produced due to the vibration of the medium particles.
- 2- They don't travel through free space (vacuum).
- 3- Their speed is relatively low.

Examples :

- Sound waves.



- Water waves.



B Electromagnetic waves

Electromagnetic waves

They are waves accompanied by electromagnetic forces and they don't need a medium to travel through.

Their characteristics :

- 1- They are accompanied by electromagnetic forces.
- 2- They can spread in all media and free space.
- 3- Their speed is extremely high equals 300 millions m/sec.

Examples :

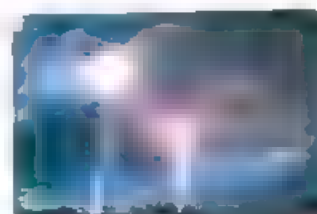
- Light waves.
- Microwaves.
- Radio waves.
- X-rays.
- Gamma rays.
- Ultraviolet and infrared rays (which are emitted from the Sun).

G R. • **We receive the sunlight and we don't hear the sound of solar explosions.**

Because the sunlight is electromagnetic waves, which can travel through space, while the sound of solar explosions is mechanical waves, which can't travel through space

• **We see lightning before hearing thunder although they occur at the same time.**

Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, where the speed of electromagnetic waves is much greater than the speed of mechanical waves.

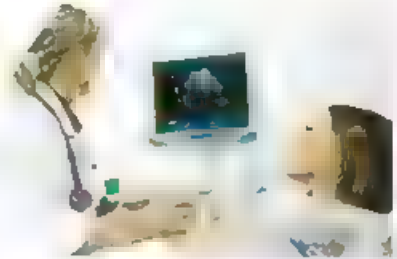


Technological applications of waves

A Some technological applications of sound mechanical waves :

1

Examining and curing equipments for the human body using sound waves (**ultrasonic waves**).



Musical instruments :

a. **Stringed musical instruments** (contain strings) such as : the violin, the lute and the guitar.



2

b. **Pneumatic musical instruments** such as : flute or reed pipe.



3

Amplifiers and devices of distributing and controlling sound used in broadcasting studios.



B Some technological applications of electromagnetic waves :

1

Ultraviolet (UV) rays :

They are used to sterilize the sets of surgical operations rooms.



X-rays :**They are used in :**

- Photographing bones to detect the sites of bone fractures.
- Examining metal (mineral) raws in industry and showing errors, pores and cracks in these minerals.
- Studying the inner structure of minerals crystals.

**Gamma rays :****They are used in :**

- Medical purposes as the treatment and discovering of some swellings (tumors).

**Visible (seen) light :****It is used in :**

- Photographic cameras.
- Television cameras.
- Light shows (data show).

**Infrared (IR) rays :****They are used in :**

- Night vision systems used by modern military forces.

- Remote sensing instrument to photographing the Earth's surface using satellites.

- Cooking food **G.R.**

Because these rays have heat effect property.

- Making remote sets to control and operate electric sets (TV, DVD, air conditioner ...)



* The ultraviolet rays, X-rays and gamma rays are used in medical purposes.

* Infrared rays and visible light are used in photography.

TRY to answer worksheet

- General Exercise of the School Book on Unit 2
- Model exams on Unit 2 in the Notebook

14

Remember



Lesson Three

★ Speed :

It is the distance covered by an object in a unit time.

★ Relative motion :

It is the change in an object's position or direction as the time passes relative to another object or a fixed point known as frame of reference.

★ Types of motion :

① Transitional motion :

It is the motion in which the object's position is changed relative to a fixed point from time to time between initial and final positions.

Ex. Train motion & car motion.

② Periodic motion :

It is a motion which is regularly repeated at equal periods of time

Ex. - Vibrating motion : as motion of simple pendulum

- **Circular motion :** as the movement of the Moon around the Earth.

- **Wave motion :** as motion of water waves.

The waves causing wave motion are divided into

A Mechanical waves

- 1 They are produced by the vibration of the medium particles.
- 2 They need a medium to transfer through
- 3 Their speed is relatively low

Examples :

- Sound waves.
- Water waves.

B Electromagnetic waves

- 1 They are accompanied by electromagnetic forces.
- 2 They spread in all media and free space
- 3 Their speed is extremely high equals 300 millions m/sec.

Examples :

- Light waves.
- X-rays.
- Radio waves.

Applications of electromagnetic waves and their uses :

★ **Infrared (IR) rays :**

They are used in :

- Night vision apparatus used by modern military forces.
- Remote sensing instrument to photographing the Earth's surface using satellites.
- Cooking food.
- Making remote sets.

★ **Ultraviolet (UV) rays :**

They are used to sterilize the sets of surgical operations rooms.

★ **X-rays :**

They are used in :

- Photographing bones to detect the sites of bone fractures.
- Examining mineral raws in industry and showing errors, pores and cracks in these minerals.
- Studying the inner structure of minerals crystals

★ **Gamma rays :**

They are used in medical purposes as the treatment and discovering of some swellings

★ **Visible (seen) light :**

It is used in :

- Photographic cameras.
- Television cameras.
- Light shows.

Questions ?

on Motion

• Remember

School book questions



Interactive Exercises

1. Choose the correct answer :

- 1. The change in an object's position or direction as the time passes relative to a frame of reference is called motion.
a. periodic b. vibrating c. relative d. circular
- 2. When two cars move in the same direction with a velocity 80 km/h., the driver of the first car imagines that the second car moves with velocity km/h.
a. zero b. 80 c. 160 d. 100
- 3. If you are in a moving train, you imagine that cars moving in the same direction on the road at smaller speed
a. stop. b. move forward.
c. move backward. d. move with a high speed.
- 4. The motion of the following objects are transitional motion, except the motion of
a. train. b. simple pendulum. c. car. d. bicycle.
- 5. In the periodic motion,
a. the pathway is straight. b. motion is regularly repeated.
c. mass is regularly repeated. d. speed is regularly changed.
- 6 The motion of a simple pendulum is considered motion
a. vibrating b. circular c. wave d. transitional
- 7 The movement of the Moon around the Earth is considered motion.
a. vibrating b. circular c. wave d. transitional
- 8 All of the following are periodic motions, except the
a. fan motion b. pendulum motion.
c. train motion. d. sunflower motion.
- 9. All of the following are motions regularly repeated in equal periods of time, except
a. wave motion. b. circular motion.
c. vibrating motion. d. transitional motion.
- 10. The movement of electrons around the nucleus is considered motion.
a. vibrating b. circular c. transitional d. wave
- 11 All of the following are properties of sound waves, except
a. they are mechanical waves.
b. they are produced due to vibration of medium particles.
c. they need a medium to travel.
d. they travel through free space.

12. Sounds are produced due to
 a. vibration of medium particles. b. electromagnetic forces.
 c. electrostatic forces. d. wave motion.
13. Mechanical waves are characterized by ...
 a. their speed is greater than that of electromagnetic waves.
 b. their speed is 300 millions m/sec.
 c. their need for a medium to propagate through.
 d. (a) and (c).
14. waves is an example of mechanical waves.
 a. Water b. Light c. Radio d. Ultraviolet
15. are used in examining and curing sets for human body.
 a. Ultrasonic waves b. Gamma rays c. Infrared rays d. X-rays
16. All of the following are electromagnetic waves, except the
 a. thermal (infrared) rays. b. visible light.
 c. sound waves. d. ultraviolet rays.
17. We see lightning before hearing thunder because
 a. lightning occurs before thunder.
 b. sound needs a medium to travel through.
 c. the speed of light is 340 m/sec.
 d. the speed of light is much greater than that of sound.
18. The speed of both in space equals 300 million m/sec.
 a. sound and light b. X-rays and gamma rays
 c. infrared rays and water waves d. ultraviolet rays and sound waves
19. All of the following are stringed musical instruments, except
 a. violin. b. flute. c. lute. d. guitar.
20. Sound waves are used in all the following, except
 a. examining and curing sets. b. making remote sets.
 c. musical instruments. d. amplifiers.
21. are used in night vision apparatus.
 a. Infrared rays b. Ultraviolet rays
 c. Gamma rays d. X-rays
22. Infrared rays are used in cooking food because they have effect property
 a. light b. magnetic c. heat d. electric
23. Infrared rays are used in all of the following applications, except in
 a. night vision apparatus. b. cooking food.
 c. making remote sets. d. sterilization.



- 24. X-rays are used in
 - a. treatment and discovering some swellings.
 - b. photographing bones to detect bone fractures.
 - c. sterilizing the sets of surgical operation rooms.
 - d. remote sensing instruments to photograph the Earth's surface.
- 25. are used in examining mineral raws in industry.
 - a. X-rays b. Ultraviolet rays c. Infrared rays d. Gamma rays
- 26. are used in medical purposes as the treatment and discovering some swellings.
 - a. X-rays b. Ultraviolet rays c. Infrared rays d. Gamma rays
- 27. is among the applications of ultraviolet rays.
 - a. Photographing bones
 - b. Night vision apparatus
 - c. Sterilizing of the sets of surgical operation rooms
 - d. Discovering of some swellings
- 28. Visible light is used in all of the following applications, except in
 - a. night vision apparatus. b. television cameras.
 - c. photographic cameras. d. data shows.
- 29. The speed of waves of X-rays in space is the speed of waves of infrared rays.
 - a. doubled b. less than c. more than d. equal to

2. Choose from column (B) what suits it in column (A) :

(A)	(B)
Electromagnetic waves	Technological application
1. Gamma rays	a. studying the inner structure of minerals crystals.
2. X-rays	b. treatment of some swellings.
3. Visible light	c. night vision apparatus.
4. Infrared rays	d. photography.
5. Ultraviolet rays	e. sterilize the sets of surgical operations rooms.
	f. wireless communications.

Put (✓) or (x) in front of the following statements and correct the wrong ones :

1. When your car moves at a high speed and another car moves in the same direction at a slower speed, you will imagine that the other car goes forward. ()
2. When you are in a moving car and another car moves beside you in the same direction at the same speed, you will imagine that the two cars don't move ()
3. The motion of a boy from his house to the school is a periodic motion. ()

- 4 The fixed point that is used to determine the position of objects is known as the reference point. ()
- 5 Motion is divided into two types, which are circular motion and transitional motion. ()
- 6 Periodic motion is changed between initial and final positions ()
- 7 Simple pendulum motion is a wave motion. ()
- 8 The movement of the Moon around the Earth is a circular motion. ()
- 9 Water waves motion is a periodic motion. ()
- 10 Transitional motion differs from periodic motion as it has initial and final points and it doesn't repeat its motion. ()
- 11 Water waves are electromagnetic waves. ()
- 12 Sound waves are produced due to the vibration of medium particles. ()
- 13 Electromagnetic waves are accompanied by gravitational forces ()
- 14 Ultraviolet rays are used in examining and curing sets for the human body ()
- 15 Sound waves are used in pneumatic musical instruments, such as violin and guitar. ()
- 16 Ultraviolet rays are used in making remote sets and in night vision apparatus ()
- 17 X-rays are used in cooking food as they have heat effect property. ()
- 18 Infrared rays are used in sterilizing the sets of surgical operations rooms. ()
- 19 Gamma rays are used in photographing bones. ()
- 20 X-rays are used in examining mineral raws in industry. ()
- 21 Gamma rays are used in treatment and discovering some swellings ()
- 22 We use infrared rays in light shows. ()

4. Write the scientific term of each of the following

- 1 The distance covered by an object in a unit time.
- 2 It is the change of an object's position or direction as time passes relative to a fixed point
- 3 A fixed point used to determine the object's position or to describe its movement
- 4 • An object's position changes as time passes from its initial position to a different final one
 - It is the motion of an object in which its position changed relative to a fixed point from initial to final positions.
- 5 The motion which is regularly repeated in equal periods of time.
- 6 A kind of periodic motion, which is produced by a simple pendulum
- 7 A kind of periodic motion, which describes the movement of the Moon around the Earth.
- 8 A kind of periodic motion by which sound and light are transferred from one place to another

- 9. Waves produced due to the vibration of medium particles.
- 10. Waves which need a medium, such as air to transfer through
- 11. Waves which don't need a medium to travel through.
- 12. Waves which are accompanied by electromagnetic forces
- 13. Electromagnetic rays have a thermal effect.

5. Complete the following statements .

- 1. Relative motion is the change in an object's _____ or _____ as the time passes relative to another object or a fixed point known as ...
- 2. When two cars move in the same direction at the same speed, drivers imagine that the two cars _____ moving and no motion will be observed.
- 3. If car (A) moves at a higher speed than car (B) and in the same direction, the driver in car (A) will imagine that car (B) moves _____
- 4. Types of motion are _____ motion and _____ motion.
- 5. Transitional motion is the motion in which the object's _____ is changed from time to time relative to a fixed frame of reference from _____ position to another _____ one
- 6. The movement of the Moon around the Earth is a _____ motion, while that of the bicycle and the train is a _____ motion.
- 7. Transitional motion is not considered as periodic motion because it has _____ and _____ points and it doesn't _____ its motion.
- 8. _____ motion is a motion which is regularly repeated in _____ periods of time
- 9. _____, _____ and _____ are examples of periodic motion.
- 10. The motion of simple pendulum is considered _____ motion, while that is produced from throwing a stone in water is considered _____ motion and both are considered as forms of _____ motion
- 11. Waves are divided into two kinds, which are _____ waves and _____ waves.
- 12. Sound waves and _____ waves are examples of _____ waves.
- 13. Mechanical (sound) waves don't transfer through _____ but they need a _____ like air to transfer through.
- 14. Mechanical waves are produced due to the _____ of the medium
- 15. Electromagnetic waves don't need a _____ to travel through, so they can travel through _____
- 16. Water wave is an example of _____ waves, while light wave is an example of _____ waves.
- 17. Electromagnetic waves are accompanied by _____ forces.
- 18. _____ and _____ rays are emitted from the Sun.

- 19. _____ and _____ are examples of electromagnetic waves.
- 20. Thunder sound transfers in a form of _____ waves, whereas lightning flash transfers in a form of _____ waves.
- 21. We see lightning before hearing thunder, because the speed of sound is _____ than the speed of light.
- 22. Light waves can spread out in all media and _____ with a speed of _____ m/sec
- 23. The violin and the guitar are among _____ musical instruments, while _____ and reed pipe are among _____ musical instruments.
- 24. _____ rays are used in night vision apparatus, while _____ rays are used in photographic cameras.
- 25. _____ rays are used in sterilizing the sets of surgical operations rooms, while _____ rays are used in discovering some swellings.
- 26. _____ rays are used in cooking food as they have _____ effect.
- 27. _____ and _____ are among the applications of X-rays.
- 28. Visible light is used in _____, TV cameras and in _____
- 29. _____ rays are used in remote sensing instruments.

6. Give reasons for :

1. The movement of trees and buildings related to a person in a moving car is considered a relative motion.
2. A train motion is a transitional motion.
3. • Vibrating motion is a periodic motion.
 - Circular motion is a periodic motion.
 - The motion of the pendulum is a periodic motion.
4. Transitional motion differs from periodic motion.
5. We receive the sunlight at the same time we don't hear the sound of solar explosions.
6. (.) Astronauts can't hear each other voices directly in space.
7. We see lightning before hearing thunder although they occur at the same time.
8. Sound needs a medium to travel through, while light travels through space.
9. Sound and water waves are mechanical waves.
10. Remote sets don't need a medium to control operating the electrical appliances
11. Infrared rays are used in cooking.
12. X-rays are used in photographing bones.
13. X-rays are used in examining mineral raws in industry.
14. Gamma rays have medical purposes.
15. Exposing dental treatment tools for ultraviolet rays before reuse

7. Define each of the following :

- | | |
|----------------------|---------------------------|
| 1. Speed. | 2. Relative motion. |
| 3. Mechanical waves. | 4. Electromagnetic waves. |
| 5. Periodic motion. | 6. Transitional motion. |

8. What happens when ... ?

- Two objects move at the same speed and in the same direction.
- A car next to your stopping car moves backward suddenly.
- A car next to your stopping car moves forward suddenly.

9. Give an example indicating each of the following :

- | | |
|-------------------------------------|------------------------------------|
| 1. Relative motion. | 2. Transitional motion. |
| 3. Vibrating motion. | 4. Circular motion. |
| 5. Wave motion. | 6. Mechanical waves. |
| 7. Electromagnetic waves. | 8. Rays emitted from the Sun. |
| 9. Stringed musical instruments | 10. Pneumatic musical instruments. |
| 11. Rays have heat effect property. | |

10. Choose the odd word out (mention the reason for your choice) .

- A person motion / A simple pendulum motion / A car motion / A train motion.
- The movement of the rotary swing / The movement of the electrons around the nucleus ,
The movement of the Moon around the Earth / The movement of a piece of cork on the
surface of shaking water.
- Transitional motion / Vibrating motion / Circular motion / Wave motion.
- Radio waves / Microwaves / Water waves / X-rays.
- Light waves / Sound waves / Water waves.

11. Mention the name of rays (or waves) which are used in each of the following :

- Medical examining.
- Examining and curing sets for the human body.
- Remote sensing instrument to photograph the Earth's surface using satellites.
- Cooking food.
- Making remote sets to control and operate electric sets.
- Sterilizing the sets of surgical operations rooms.
- Photographing bones to detect the sites of bone fractures.
- Examining mineral raws in industry.
- Treatment and discovering some swellings.
- Photographic cameras.
- Television cameras and light shows.

1. Mention one application of each of the following rays :

1. Sound waves.
2. Infrared rays.
3. Ultraviolet rays.
4. X-rays.
5. Gamma rays.
6. Visible light.

13. Compare between :

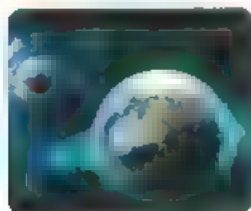
1. Transitional motion and periodic motion. [Give examples of each of them]
2. • Mechanical waves and electromagnetic waves.
 - Light waves and sound waves
3. Train motion and fan arms motion.
4. Simple pendulum motion and water waves motion.

14. Various questions :

1. Mention three examples of the transitional motion.
2. Mention three examples of the periodic motion.
3. Mention two examples of each of the mechanical waves and electromagnetic waves.
4. Mention three kinds of electromagnetic waves used in photographing field

Mention the type of motion represented by each figure .

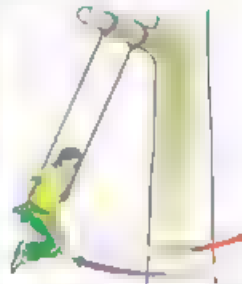
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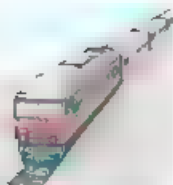
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(3)



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(5)



(6)



(7)



(8)



(9)



Thinking Skills

Questions

1. If a bicycle moves for 15 minutes.

- Between two points.
- In a circle around a certain point several times.

Which of these motions is periodic motion and which is transitional motion ? Why ?

2. When watching a football match at the stadium, the voice of the internal broadcaster was heard from the radio before hearing his voice from the internal radio in the stadium. Explain why ?

3. Describe the motion of each of the following objects :

1. A car moves beside your car in the same direction at the same speed
2. Your car moves beside a stopping car.
3. A car moves beside your car in the opposite direction.
4. A train moves from Alex. to Cairo.
5. Sunflower plant.

3

Earth and Universe

Lesson 1 | Celestial Bodies.

Lesson 2 | The Earth.

Lesson 3 | Rocks and Minerals.



Unit Objectives :

By the end of this unit, students will be able to :

- Identify planets, stars and moons.
 - Identify asteroids, comets and meteorites.
 - Compare between the planet, the star and the moon.
 - Compare between the planets and asteroids.
 - Explain the difference of gravity from a planet to another.
 - Identify the characteristics of the inner and outer planets.
 - Compare between the characteristics of both inner and outer planets
- Explain some celestial bodies pictures that are taken by telescopes or satellites



- Identify the location of the Earth in the solar system
- Identify the Earth's volume, shape and mass
- Explain the characteristics of the Earth that support the continuity of life
- Indicate the inner structure of the Earth
- Explain the different types of rocks
- Compare between the three types of rocks
- Give examples of different types of rocks
- Identify some minerals that form rocks

Appreciate the grandeur of Allah in providing all reasons for life on the Earth's surface

Lesson

1

The Celestial Bodies



What are the celestial bodies ?

- There are many bodies found in the universe such as stars, planets, moons, etc., these bodies are called celestial bodies.
- All of celestial bodies are in a permanent motion according to the will of Allah.



Celestial bodies

They are bodies swim in space such as stars, planets, moons and rocky or gaseous bodies.

Stars

- When you look at the sky in a clear moonless night, you will see a huge number of bright bodies called "Stars".

Stars

They are big-sized bodies that emit enormous amounts of heat and light.





- They appear small although they are big-sized **G.R.**

Because they are millions of kilometres away from us.

- The distances between stars are very large, so astronomers don't measure them in kilometres, but with the "Light year".

Light year—

It is the distance covered by light in one year and it equals 9.467×10^{12} km.

$$\text{Distance in light year} = \frac{\text{Distance in km}}{9.467 \times 10^{12}}$$

What is meant by ...?

The distance between the Sun and a star is three light years.

⇒ This means that the distance between the Sun and this star = $3 \times 9.467 \times 10^{12}$
 $= 28.401 \times 10^{12}$ km.

To calculate the distance in light year

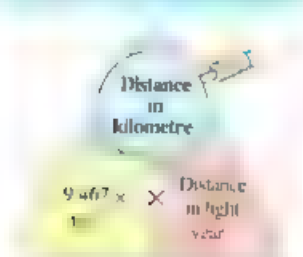


Ex. Calculate the distance in light year between two stars, if the distance between them equals 37.868×10^{12} km.

Solution :

$$\begin{aligned} \text{Distance in light year} &= \frac{\text{Distance in kilometre}}{9.467 \times 10^{12}} \\ &= \frac{37.868 \times 10^{12}}{9.467 \times 10^{12}} = 4 \text{ light years.} \end{aligned}$$

To calculate the distance in kilometre



Ex. Calculate the distance in kilometre between the Sun and a star if the distance between them equals 5 light years.

Solution :

$$\begin{aligned} \text{Distance in km} &= \text{Distance in light year} \times 9.467 \times 10^{12} \\ &= 5 \times 9.467 \times 10^{12} \\ &= 47.335 \times 10^{12} \text{ km.} \end{aligned}$$

G.R.

- The stars seem as light points although they are huge.
- The stars seem as very small light points in spite of their big sizes.
Because they are far from us.
- Astronomers do not measure the distances between stars in kilometres.
Because these distances are too huge to be measured in kilometres.

Galaxies

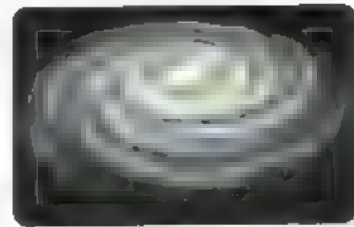


The stars are found in groups called “Galaxies”.

Galaxies

- They are the greatest units that form the universe.
- They are a tremendous collection of stars.
- They are a system that consists of thousands of millions of stars.

- The galaxy that our solar system belongs to is known as “The Way of Chopped Hay galaxy” or “The Milky Way galaxy”.

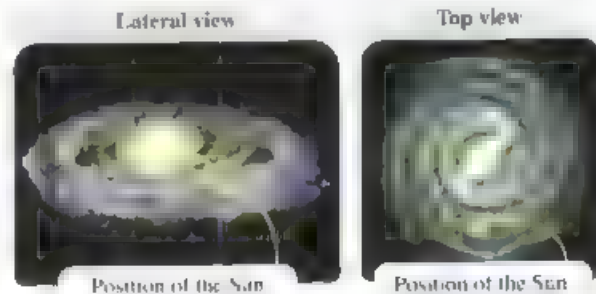


Milky Way galaxy

- Milky Way galaxy takes an oval shape with coiled spiral arms extend from it, the Sun lies on one of these spiral arms.

For illustration :

The Milky Way galaxy is given that name, because it appears in the sky at night as a splashing milk or spreading straw



Position of the Sun in the Milky Way galaxy

- We can summarize the previous explanation in the following diagram :



The celestial bodies

are found in groups called



Galaxies

our galaxy in the universe is called



The Milky Way galaxy

which contains



Our solar system

The discovery of the celestial bodies

- Astronomers discovered the celestial bodies by instruments called "Telescopes".
- Function of telescopes - They are used for identifying the celestial bodies.

Types of telescopes

1 Reflecting telescope



2 Refracting telescope



Note

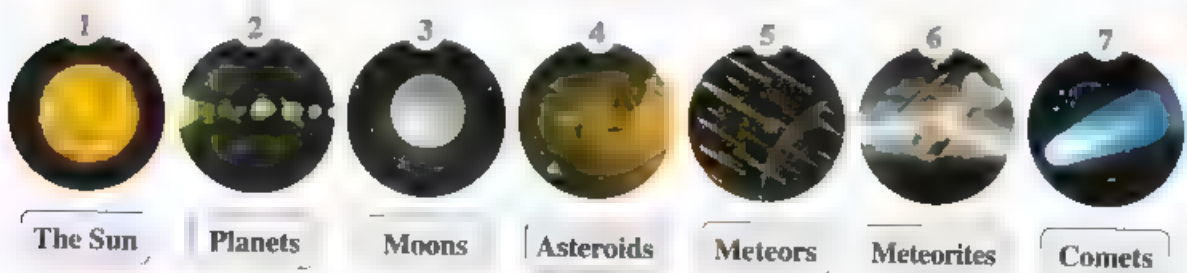
The first scientist who invented a telescope to monitor space was the scientist Galileo and it is called Galileo telescope.

Solar system



- Through the astronomical explorations, astronomers knew that the solar system consists of some celestial bodies that are shown in the following diagram :

The solar system consists of



1

- It is the star of our solar system.
- It is the biggest body in the solar system.
- It lies in the centre of the solar system and the other bodies of the solar system revolve around it.



2

Planets

They are eight spherical opaque bodies revolve around the Sun in one direction (anti-clockwise) in semi-circular or elliptical (oval) paths.

- The paths of planets lie in one plane perpendicular to the Sun's axis of rotation around itself.

G.R. Planets revolve around the Sun in fixed orbits.

Due to the attraction force of the Sun to the planets

The arrangement of planets

1. According to their distances from the Sun (beginning from the nearest to the farthest) as follows

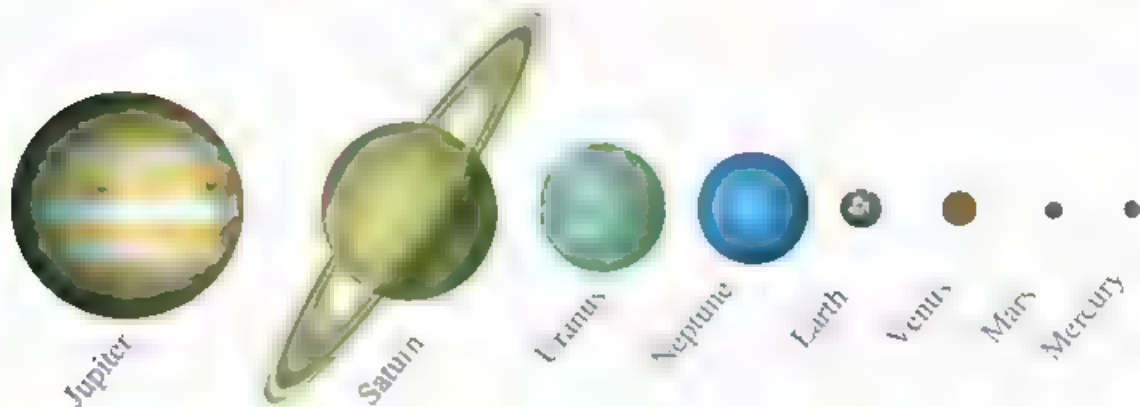
1. Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune Farthest





2. According to their **sizes** (beginning from the biggest to the smallest) as follows

Biggest Jupiter - Saturn Uranus Neptune Earth Venus Mars Mercury **Smallest**



Notes

- Mercury is the nearest planet to the Sun, while Neptune is the farthest planet from the Sun
- Jupiter is the biggest planet in the solar system, while Mercury is the smallest one.
- The nearest two planets to the Earth are Venus and Mars.
- The Earth planet has the highest density.
- The Earth planet occupies :
 - The **third** order according to the distance from the Sun.
 - The **fourth** order (ascendingly) according to the volume.
 - The **fifth** order (descendingly) according to the volume

Exercise

Who am I ?

- The nearest planet to the Sun. ()
- The farthest planet from the Sun. ()
- The biggest planet in the solar system. ()
- The smallest planet in the solar system. ()
- The nearest two planets to the Earth. (&)

Answers

- Mercury.
- Neptune.
- Jupiter.
- Mercury.
- Venus – Mars.

Classification of planets

The planets of the solar system are divided into two groups according to their distances from the Sun, which are :

A The small or inner planets group

B The big or outer planets group

Distance from the Sun

- The nearest four planets to the Sun are .

1. Mercury. 2. Venus.
3. Earth. 4. Mars.

So, they are called the inner planets group.

- The farthest four planets from the Sun are

1. Jupiter. 2. Saturn
3. Uranus. 4. Neptune

So, they are called the outer planets group.

Size

- They are small, so they are called small planets.

- They are big, so they are called giant planets.

Structure

- They are rocky bodies that have a solid surface.

- They are gaseous bodies that are formed of gaseous elements in a solidified state (the most important of them are hydrogen and helium).

Density

- Their densities are high (ranging between 3.3 to 5.5 gm/cm³.) **G.R.**

Because they consist of solid bodies.

- Their densities are low (ranging between 0.7 to 1.3 gm/cm³.) **G.R.**

Because they consist of gaseous bodies.

Atmosphere

- All of them have an atmosphere except Mercury.

- All of them have an atmosphere.

Moons

- Mercury and Venus have no moons.
- The Earth has one moon, while Mars has two moons rotating around them.

- They have large number of moons rotating around each of them.

G.R. The presence of hydrogen gas in a solidified state on the surface of outer planets.

Due to the high pressure and extreme coldness on the surfaces of these planets



The difference of gravity acceleration on the surfaces of the planets

You know from the previous unit that the scientist Isaac Newton was the first one who discovered the Earth's gravity force when he was standing under a tree and he found an apple falling down to the ground.

Then he proved that there is a force of gravity (attraction force) between any two objects in the space.



The force of gravity depends on

1 The mass of each object

"directly proportional"

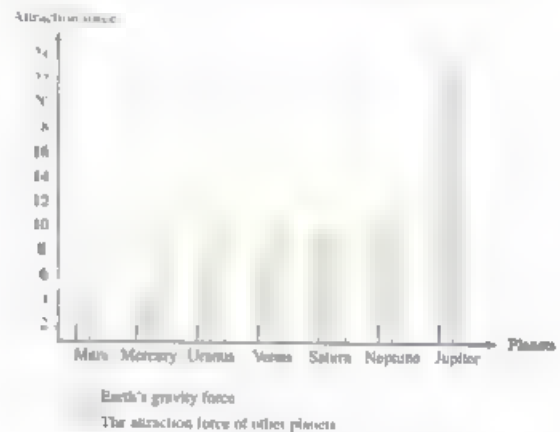


2 The distance between them

"inversely proportional"



The force of gravity differs from a planet to another according to the difference in its mass, where the gravity of the planet increases by increasing its mass and vice versa.



The force of gravity on the surface of planets

★ The following table shows the ascending order of the planets according to the acceleration due to gravity on its surfaces :

Planet	Mars	Mercury	Uranus	Venus	Saturn	Earth	Neptune	Jupiter
Acceleration due to gravity on its surface (m/sec²)	3.72	3.78	7.77	8.60	9.05	9.78	11.00	22.88

G.R. The gravity on the Earth's surface is larger than that on Mars surface.

Because the mass of the Earth planet is larger than that of Mars planet and the force of gravity is directly proportional to the mass.

Notes

- Acceleration due to gravity is the largest on Jupiter planet, while it is the least on Mars planet
- The Earth has the largest gravity on its surface in the inner planets.

TRY to answer worksheet in the Notebook

15

3

Moons

They are followers (small space bodies) that are affected by the gravity of the planets that rotate around them.

As in case of our Moon, which is the follower of the Earth.



G.R. *The Moon is considered the follower of the Earth planet.*

Because the Moon rotates around the Earth planet and it is affected by its gravity.

The following table shows the number of moons, which rotate around each planet of the solar system :

Planet	Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune
No. of moons rotating around it	–	–	1	2	62	60	27	12

4

- They are thousands of different sized rocky masses that rotate around the Sun in a certain region called “The belt of the wanderer asteroids” which lies between the orbits of Mars and Jupiter.



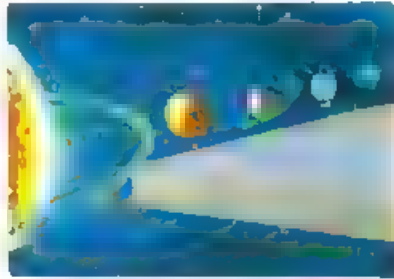
Asteroids

Asteroids

They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids.

The belt of the wanderer asteroids

It is a region that separates the group of the inner planets from the group of the outer planets.



The belt of the wanderer asteroids



Asteroids of different sizes



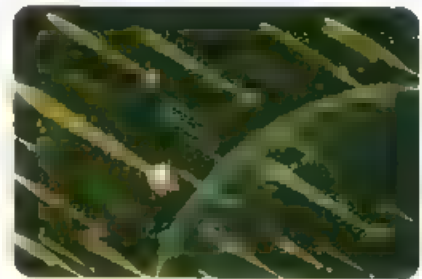
Asteroid

- Some of these rocky masses may emerge from their orbit around the Sun and swim in space, but some of them penetrate the Earth's atmosphere in the form of meteors and meteorites.

5

Meteors

They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.



Meteors

G.R. *Sometimes, we see some luminous lines in the sky at clear nights.*

Due to the burning of small rocky masses when they penetrate the Earth's atmosphere as a result of heat produced from their friction with air forming meteors.

6

Meteorites :

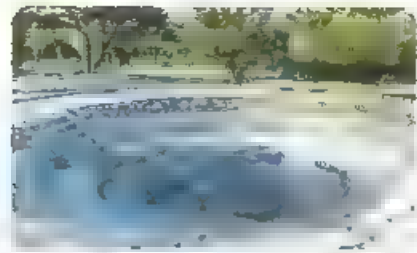
Meteorites

They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface.



Meteorites

- The biggest meteorite till now has a mass of 80 tons and exists at the southern west of Africa



The biggest meteorite

What happens when ...?

A large asteroid (meteorite) penetrates the Earth's atmosphere.

- ➡ Its outer surface burns only and the remaining part of it without burning falls on the Earth's surface

7 DO IT YOURSELF



Comets

They are masses of rocks, ice and solidified gases that revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.



Rotation of comets around the Sun

Structure of comet :

The comet consists of two parts, which are

1 The head

It is the first part of the comet and it contains icy spheres, which are a mixture of :

- Solidified gases [carbon dioxide, nitrogen and methane gases].
- Rocky parts.
- Dust and water molecules.



Structure of comet

2 The tail

It is the second part of the comet and it is considered a gaseous cloud

- The most famous comet is Halley, which completes its revolution around the Sun every 76 years.

TRY to answer worksheet in the Notebook

16

Remember



Lesson One

★ Celestial bodies :

They are bodies swim in space such as stars, planets, moons and rocky or gaseous bodies.

★ Light year :

It is the distance covered by light in one year and it equals 9.467×10^{12} km.

★ Galaxies :

- They are the greatest units that form the universe.
- They are a tremendous collection of stars.

★ The galaxy that our solar system belongs to is the Milky Way galaxy

Solar system consists of :

1. The Sun :

It is the star of our solar system.

2. Planets :

They are eight spherical opaque bodies revolve around the Sun in oval orbits.

Inner planets group

They are the nearest four planets to the Sun in the solar system. *Mercury, Venus, Earth, Mars*

Outer planets group

They are the farthest four planets from the Sun in the solar system. *Jupiter, Saturn, Uranus, Neptune*

3. Moons :

They are followers (small space bodies), that are affected by the gravity of the planets that rotate around them.

4. Asteroids :

They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids.

5. Meteors :

They are small rocky masses that burn up completely when fall within the atmosphere of the Earth and seen in the sky as luminous arrows.

6. Meteorites :

They are large rocky masses that fall from the space and reach the Earth's surface.

7. Comets :

They are solidified masses of ice, gases and rock pieces that revolve around the Sun.

Questions ?

on Lesson One

● Remember ● Understand ● Apply ● Higher skills ● School book questions.



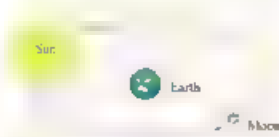



Interactive
Exercises

1. Choose the correct answer :

- 1. emit large amounts of heat and light.
 - a. Stars
 - b. Galaxies
 - c. Planets
 - d. Moons
- 2. The distance between stars are measured in unit.
 - a. metre
 - b. kilometre
 - c. newton
 - d. light year
- 3. The distance covered by the light in one year is called
 - a. astronomical unit.
 - b. light year.
 - c. speed of light.
 - d. kilometre.
- 4. Astronomers measure the distances between stars with light year, because the stars
 - a. generate great amounts of light and heat.
 - b. are near from each other.
 - c. are millions of kilometres away from us.
 - d. seem as small light points.
- 5. The distance covered by light in two years equals km.
 - a. 9.467×10^{12}
 - b. 9.467×10^6
 - c. 18.934×10^{12}
 - d. 18.934×10^6
- 6. If a star is far from the Sun by $47\,335 \times 10^{12}$ km , then the distance between them is light years.
 - a. 2
 - b. 3
 - c. 4
 - d. 5
- 7. The greatest units that form the universe are
 - a. planets.
 - b. galaxies.
 - c. stars.
 - d. moons.
- 8. Our galaxy is called the .
 - a. Gemini.
 - b. Milky Way.
 - c. Scorpion.
 - d. Ursa Major.
- 9. [L] The telescope is used to study the
 - a. minerals.
 - b. earthquakes.
 - c. celestial bodies.
 - d. volcanoes.
- 10. [L] In addition to the Sun, the solar system includes
 - a. eight planets only.
 - b. asteroids, meteorites and comets only.
 - c. stars and planets.
 - d. eight planets with the asteroids, meteorites and comets.
- 11. [L] Planets revolve around the Sun in paths.
 - a. circular
 - b. elliptical
 - c. spiral
 - d. irregular



- 12. The number of planets revolving around the Sun is
 a. 5 b. 4 c. 8 d. 9
- 13. The nearest two planets to the Earth are ..
 a. Mercury and Venus. b. Venus and Mars.
 c. Mars and Jupiter. d. Mars and Mercury.
- 14. The nearest planet to the Sun is
 a. Earth. b. Mercury. c. Neptune. d. Jupiter.
- 15. The farthest planet from the Sun in the solar system is
 a. Neptune. b. Uranus. c. Mercury. d. Venus.
- 16. The number of inner planets is
 a. three. b. four. c. five. d. nine.
- 17. The nearest outer planet to the Sun is
 a. Jupiter. b. Uranus. c. Neptune. d. Saturn.
- 18. The outer planets formed of several elements, the most important of them are hydrogen and helium in state.
 a. gaseous b. liquid c. solidified d. molten
- 19. The big-sized, less dense planet, which consists of gaseous elements is
 a. Earth. b. Mercury. c. Jupiter. d. Venus.
- 20. are gaseous planets.
 a. Mercury and Earth b. Venus and Mars
 c. Venus and Earth d. Uranus and Neptune
- 21. All of the following are among the outer planets, except
 a. Mars. b. Jupiter. c. Uranus. d. Neptune.
- 22. All of the following are among the inner planets, except
 a. Saturn. b. Mars. c. Earth. d. Mercury.
- 23. The densities of inner planets ranging between gm/cm^3
 a. 3.3 to 1.3 b. 3.3 to 5.5 c. 0.7 to 1.3 d. 0.7 to 5.5
- 24. are among the characteristics of outer planets.
 a. High pressure and high temperature
 b. High pressure and extreme coldness
 c. Low pressure and high temperature
 d. Low pressure and extreme coldness
- 25. is the scientist who proved the presence of attraction force between any two objects in the space.
 a. Galileo b. Isaac Newton c. Max Planck d. Einstien
- 26. Which of the following planets has the largest gravity on its surface ?
 a. Mars. b. Mercury. c. Venus. d. Earth.

27. The followers of the planets are called
 a. stars. b. spaceships. c. moons. d. comets.
28. The figure represents the relation between the Sun, the Earth and the Moon
 a.  b.  c.  d. 
29. The planet which has the greatest number of moons revolving around it is
 a. Saturn. b. Jupiter. c. Uranus. d. Neptune.
30. Mars has moon(s).
 a. one b. two c. three d. four
31. The sum of the numbers of moons of planets of the solar system equals moons
 a. 60 b. 62 c. 80 d. 164
32. are rocky bodies of variable sizes and irregular shapes situated between Mars and Jupiter planets.
 a. Moons b. Galaxies c. Asteroids d. Comets
33. separates between the outer planets and the inner planets.
 a. Meteor's region b. Asteroids' belt
 c. Comets' belt d. Meteorite
34. The shooting lines seen at clear nights are called
 a. comets. b. meteors. c. meteoroids. d. meteorites.
35. are huge rocky masses that fall from the space and reach the Earth's surface.
 a. Meteorites b. Comets c. Asteroids d. Meteors
36. The mass of the biggest meteorite found up till now reaches tons.
 a. 100 b. 80 c. 50 d. 10
37. Comets, asteroids and meteors revolve around
 a. the Earth. b. the Moon. c. the Sun. d. Jupiter.
38. Comets revolve around the Sun in fixed orbits.
 a. circular b. elliptical c. curved d. square
39. The comet consists of ..
 a. frozen gas only. b. ice only.
 c. rocky parts only. d. rocky and icy particles and water.
40. The head of the comet consists of a mixture of solidified gases, which are gases.
 a. oxygen, nitrogen and carbon dioxide
 b. hydrogen, helium and methane
 c. oxygen, helium and nitrogen
 d. carbon dioxide, nitrogen and methane



- 41. ... comet is the most famous one.
 - a. Gahleo's b. Halley's c. Newton's d. Nobel's
- 42. Halley's comet completes its orbit around the Sun each .
 - a. 68 years. b. 76 years. c. 76 months. d. 21 years.

2. (A) Choose from column (B) what suits it in column (A) :

1	(A)	(B)
	1. Galaxy	a. measures the distances between stars.
	2. Light year	b. is the greatest universe unit.
	3. Telescope	c. separates the outer planets from the inner planets.
	4. The belt of the wanderer asteroids	d. explores the space.

2	(A)	(B)
	1. The nearest planet to the Sun.	a. Jupiter
	2. The farthest planet from the Sun.	b. Mars
	3. The fourth planet away from the Sun.	c. The Sun
	4. The planet, whose gravitational force on its surface is 7.77 m/sec^2 .	d. Earth
	5. The biggest planet in the solar system.	e. Mercury
	6. The planet which has one moon revolves around it.	f. Neptune
		g. Uranus
		h. Venus

(B) Choose from columns (B) and (C) what suit them in column (A) :

(A)	(B)	(C)
1. Stars	a. Different sized rocky masses	A. emit large amounts of heat and light.
2. Asteroids	b. Big sized bodies	B. have moons rotate around them.
3. Meteorites	c. Large rocky masses	C. orbit the Sun in elongated elliptical orbits.
4. Comets	d. Masses of rocks, ice and solidified gases	D. rotate between Mars and Jupiter.
	e. Small rocky masses	E. fall on the Earth's surface.

3. Put (✓) or (x) in front of the following statements and correct the wrong ones :

- 1. The stars, planets and moons are celestial bodies. ()
- 2. The celestial bodies are in a permanent motion according to the will of Allah. ()
- 3. The Milky Way galaxy takes an oval shape with straight arms. ()
- 4. Reflecting and refracting microscopes are used for identifying the celestial bodies. ()
- 5. The Sun is our planet in the solar system. ()

6. There are eight spherical lightened planets revolve around the Sun. ()
7. The paths of planets lie on one plane perpendicular to the Sun's axis of rotation around itself. ()
8. The small or inner planets are Mercury, Venus, Earth and Saturn. ()
9. The densities of the small planets are high ranging between 0.7 to 1.3 gm/cm³. ()
10. Inner planets are solid bodies. ()
11. The number of moons of the inner planets equals 3 moons. ()
12. The Earth is the third planet according to the distance from the Sun. ()
13. The biggest planet in the solar system is Jupiter. ()
14. Venus is the seventh planet according to its distance from the Sun. ()
15. Jupiter is nearer to the Earth than Uranus. ()
16. The outer planets are composed of rocks and they are relatively small in size. ()
17. Jupiter, Uranus and Neptune are giant planets. ()
18. The acceleration due to gravity on the surface of Neptune is 9.05 m/sec². ()
19. Jupiter is the planet which has the largest number of moons revolving around it. ()
20. Acceleration due to gravity on Saturn planet is the largest. ()
21. Asteroids' belt is located between the orbits of Jupiter and Venus. ()
22. Asteroids are the shooting lines seen at clear nights. ()
23. Comets revolve around the Sun in fixed circular orbits. ()
24. Asteroids consist of two parts, the head and the tail. ()
25. Halley's comet appears every 67 years. ()
26. The head of the comet is considered icy spheres, while its tail is considered a gaseous cloud. ()

4. Write the scientific term of each of the following :


1. Any body swims in the space as stars, planets, moons, rocky and gaseous bodies.
2. Large bodies seem as points in the sky emitting enormous amounts of heat and light.
3. The distance covered by light in one year.
4. • The greatest unit which forms the universe.
• [] A system that consists of thousands of millions of stars.
5. The galaxy which our solar system belongs to.
6. Eight spherical opaque bodies that revolve around the Sun in elliptical orbits.
7. The star of our solar system.
8. • The nearest four planets to the Sun.
• A group of planets that have high density and smaller volumes than the others.
• The group of planets in the solar system, that consist mainly of rocks and have small sizes.
9. • The farthest four planets from the Sun.
• The group of planets in the solar system, that consist mainly of gases and have huge sizes.



- 10. • An inner planet has no atmosphere.
 - The nearest planet to the Sun.
- 11. Inner planets have no moons.
- 12. • One of the eight planets, that revolve around the Sun and it is the third planet far from the Sun.
 - The inner planet that has one moon revolves around it.
- 13. • The biggest planet in the solar system.
 - The planet which has the largest acceleration due to gravity on its surface.
 - The outer planet which has the largest number of moons revolves around it
- 14 • The planet which has the least acceleration due to gravity on its surface.
 - The inner planet that has two moons revolve around it.
- 15. Small space bodies that are affected by the planets' gravity.
- 16. • Thousands of different sized rocky masses, which rotate between the orbits of Mars and Jupiter.
 - Space objects belong to the solar system and they are located between the inner planets and the outer planets.
- 17. The region which separates between the inner and the outer planets
- 18 • Luminous lines which are formed in the sky due to the complete burning of small rocky masses in the Earth's atmosphere.
 - Small rocky masses that burn up completely in the Earth's atmosphere
- 19. • Celestial bodies of huge solid rocky masses that do not burn up completely when they penetrate the atmosphere and fall on the Earth's surface.
 - The rock masses that fall from the space and reach the Earth's surface.
- 20 • Gaseous bodies formed of a head and a tail and revolve around the Sun in elliptical orbits.
 - Solidified masses of ice gases and rock pieces revolve around the Sun
- 21. The most famous comet which completes its revolution around the Sun each 76 years.


5. Complete the following statements :

- 1. Any body swims in the space is called
- 2 are large round bodies generating large amounts of heat and light
- 3. The distance covered by the light in one year is called
- 4. The galaxy that our solar system belongs to is called -- or the Way of
- 5. The types of telescopes are and - telescopes.
- 6. Telescopes are used for identifying the
- 7. The star of our solar system is the
- 8. The solar system includes -- , moons, meteors, , and comets.
- 9. The number of planets that revolve around the Sun is

10. Planets revolve around the Sun in _____ orbits, which lie in a level _____ to the Sun's axis of rotation.
11. Planets of the solar system are divided according to their distances from the Sun into two groups, which are _____ and _____ planets.
12. Planets are arranged according to their distances from the Sun as follows _____, _____, Earth, _____, Jupiter, Saturn, _____ and Neptune.
13. The nearest planet to the Sun is _____ and the farthest one from the Sun is _____.
14. The biggest planet in volume is _____ and the highest one in density is _____.
15. The Earth lies between _____ and _____ planets, while the _____ planet lies between Neptune and Saturn planets.
16. The inner planets are small bodies, so they are called _____ planets, while the outer planets are big, so they are called _____ planets.
17. Mercury, _____, _____ and Mars are the inner planets.
18. _____ and _____ planets have no moons.
19. _____ planet is from the small planets and it has no atmosphere.
20. The giant planets are formed of gaseous elements, the most important of them are _____ and _____ gases.
21.  The force of gravity between two objects depends on _____ and _____.
22. The acceleration due to gravity is the largest on _____ planet, while it is the least on _____ planet.
23. _____ planet has 27 moons revolving around it, while _____ planet has 12 moons revolving around it.
24. The number of moons revolving around Jupiter is _____, while that revolves around Mars is _____.
25. The Moon is the follower of the _____.
26. Asteroids are formed of _____, which rotate around the _____ in a certain region.
27. The belt of the wanderer asteroids separates between the orbits of _____ and _____ planets.
28. The luminous arrows, that can be seen in the sky at clear nights are called _____, while the large rocky masses, that don't burn up completely and fall on the Earth are called _____.
29. The comet consists of two parts, which are _____ and _____.
30. The head of the comet consists of a mixture of solidified gases of carbon dioxide, _____ and _____ gases and other components.
31. Comets revolve around the Sun in _____ orbits.
32. The most famous comet that the inhabitants of the Earth could observe is _____ and it completes its revolution around the Sun every _____ years.



6. Give reasons for :

1. • The stars seem as light points although they are huge.
• The stars seem as very small light points in spite of their big sizes
2. Astronomers do not measure the distances between stars in kilometres
3. Planets revolve around the Sun in fixed orbits.
4. Mercury, Venus, Earth and Mars are called the inner planets.
5. The density of the inner planets is high.
6. Jupiter, Saturn, Uranus and Neptune are called the outer planets.
7.  The density of the outer planets is low.
8. The presence of hydrogen gas in a solidified state on the surface of outer planets
9. The gravity on the Earth's surface is larger than that on Mars' surface.
10. The object weight is changed from a planet to another.
11. Moons are considered the followers of the planets.
12. Sometimes, we see some luminous lines in the sky at clear nights.
13. No one can see Halley's comet more than two times in his life.

7. Choose the odd word out, then mention the scientific name of the rest :

1. Mercury – Venus – Earth – Mars.
2. The Sun – Mars – Earth – Jupiter.
3. Mercury – Venus – Saturn – Earth – Mars.
4. Jupiter – Saturn – Uranus – Neptune – Venus.
5. Earth – Venus – Neptune – Halley.
6. Asteroids – Comets – Moons – Earthquakes.

8. What do the following numbers indicate ... ?

- | | |
|---|---|
| 1. (9.467×10^{12} km). | 2. (8 Planets). |
| 3. (4 Planets). | 4. (3.3 to 5.5 gm/cm ³). |
| 5. (0.7 to 1.3 gm/cm ³). | 6. (60 Moons). |
| 7. (1 Moon). | 8. (3 Moons). |
| 9. (27 Moons). | 10. (62 Moons). |
| 11. (9.8 m/sec ²). | 12. (22.88 m/sec ²). |
| 13. (80 Tons). | 14. (76 Years). |

9. What is meant by ... ?

- | | |
|--------------------|---|
| 1. Celestial body. | 2. Stars. |
| 3. Light year | 4. The distance between two stars is 2 light years. |
| 5. Galaxies. | 6. Planets. |

- | | |
|---|-------------------|
| 7. Inner planets. | 8. Outer planets. |
| 9. Moons. | 10. Asteroids. |
| 11. The belt of the wanderer asteroids. | 12. Meteors. |
| 13. Meteorites. | 14. Comets. |

10. What happens if ... ?

1. You look at the sky in a clear moonless night.
2. We can't invent the telescope.
3. The planet becomes nearer to the Sun.
4. Travelling from Earth planet to Mars planet (related to the attraction force).
5. • Several small asteroids penetrate the Earth's atmosphere.
• Friction of meteors with Earth's atmosphere.
6. A large asteroid (meteorite) penetrates the Earth's atmosphere.

11. Compare between :

1. Stars, planets and moons.
2. Outer planets and inner planets.
3. Jupiter planet and Mars planet [according to the distance from the Sun – the number of moons rotating around each of them].
4. Comets and meteors.
5. Asteroids and planets.
6. Meteorites and meteors.

12. Problems :

1. Calculate the distance in kilometre between the Sun and a star, if the distance between them equals 6 light years.
2. Calculate the distance in light year between two stars. If the distance between them equals 28.401×10^{12} km.

13. Variant questions :

1. Arrange the planets of the solar system ascendingly according to :
 1. Their distances from the Sun.
 2. The acceleration due to gravity on their surfaces.
2. What is the importance of telescopes ? Mention their types.
3. "Galaxy is a tremendous collection of stars" :
 1. What's the galaxy which our solar system belongs to ?
 2. What's the shape of our galaxy ?
 3. Where's the position of the Sun in our galaxy ?



- 4 What is the name of the star of our solar system? What is the number of planets rotating around it?
- 5 Mention the factors that affect the attraction force between two objects.
- 6 If you know that the last time for Halley's comet to appear was in 1986.
 - 1. When did it appear before 1986 ?
 - 2. When do you expect its appearance again ?
- 7 If you and your classmates made a trip in the space to the planet Mars, and played basketball game there. Is it easier for you to jump towards the basket and put the ball inside than playing on the Earth's surface ?
Explain your answer in the light of your previous study.

14. Study the following figures, then answer the following questions :

- 1 From your previous study of the motion of the Sun and the rotation of the planets around it, complete the following :
 - 1. The metal sphere represents
 - 2. The hand represents ...
 - 3. The thread represents
 - 4. The path of the metal sphere represents



- 2 From the opposite figures, mention :
 - 1. The name of each figure.
 - 2. The importance of the devices that shown in the figures.



Fig (A)



Fig (B)

- 3 The opposite figure represents the galaxy that our solar system belongs to. Answer the following questions :
 - 1. What is the name of this galaxy ?
 - 2. From which, this galaxy consists of ?
 - 3. Complete : Point (X) refers to ...
- 4 The opposite figure represents one of the components of the solar system :
 - 1. What is expressed in the fig. ?
 - 2. Write the labels ① and ②.



(X)



Thinking Skills

Questions

1. Choose the correct answer :

1. The planets of the solar system are divided into two groups, which are inner planets and outer planets.

(A) The Earth planet is one of the inner planets. Which of the following values represents the density of the Earth planet ?

- a. 0.9 gm/cm^3 b. 5.5 gm/cm^3 c. 1.3 gm/cm^3 d. 2.5 gm/cm^3

(B) Jupiter planet is one of the outer planets. Which of the following values represents the density of an outer planet ?

- a. 3.3 gm/cm^3 b. 5.5 gm/cm^3 c. 4 gm/cm^3 d. 1.1 gm/cm^3

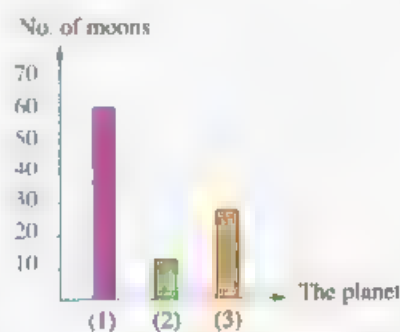
2. The mass of unit volume of Jupiter planet to the mass of unit volume of the Earth planet is one.

- a. less than b. more than c. equal to d. no correct answer

2. (A) The opposite graph represents the relation between the planet and the number of moons followed it.

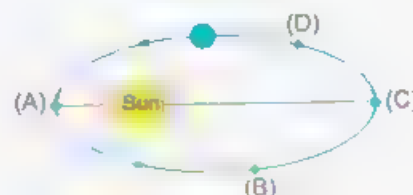
Answer the following questions :

1. Mention the names of the planets (1) , (2) and (3).
2. Choose : The number of moons of planets Earth and Mars together is quarter the number of moons of planet number (1 2 - 3)



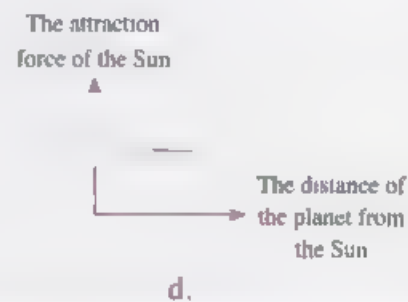
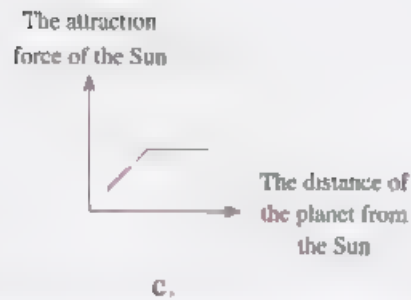
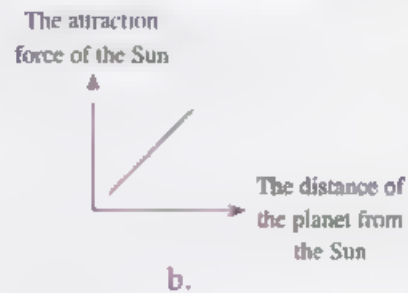
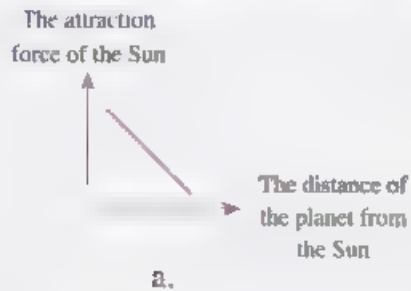
(B) The opposite figure shows the path of one of the planets around the Sun.

1. What is the name of the path in which the planet rotates and what is its shape ?
2. What is the name which is given to the planet's follower ?
3. Arrange these points (A , B , C and D) descendingly according to the effect of the central gravitational force of the Sun. Mention the effective factor.





- 3.** Which graph shows the correct relationship between the distance of the planets from the Sun and the attraction force of the Sun to the planets ?



- 4.** What happens if there is no force of attraction between the Sun and the planets ?
- 5.** The scientist Halley can see the comet, which is known by his name in 1682 and its age in this time is 20 years and he died in 1743.
 * If you think that he sees this comet again or no ? Give a reason.
- 6.** Mention the similarities between the solar system and the oxygen atom.

2

The Earth



What is there life on the Earth's surface ?



- You have learned in the previous lesson that the Sun occupies the centre of the solar system and the Earth is one of the eight planets revolving around it.
- The Earth is the planet that we live on, so we will study it in detail.



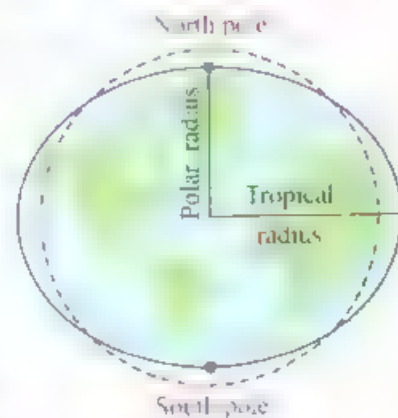
Description of the Earth

1 Earth's shape :

The Earth is a spherical object, which is about to be completely circular accompanied by :

- A slight flattening at the two poles.
- Indented outward at the equator, *where the tropical radius is about 22 km larger than the polar radius.*

G.R. *The tropical radius is larger than the polar radius.*
Because the Earth is slightly flattened at its poles and indented outward at the equator.



2 Earth's rotation around the Sun :

- The Earth with the other planets revolve around the Sun by the action of gravity.

The Earth completes one revolution around the Sun in 365.25 days.



Revolution of the Earth around the Sun

3 Earth's location related to the Sun :

- The Earth occupies the third position according to its distance from the Sun. (it is preceded by Mercury and Venus).

The distance between the Sun and the Earth is about 150 million kilometres.

4 Earth's volume :

- Concerning the volume, the Earth occupies the medium position in the solar system **G.R.**

Because it is the biggest inner planet and it is smaller than any planet from the outer planets.

- It occupies the fourth order (ascendingly) regarding the volume.

Its average radius is about 6386 km approximately.

5 Earth's mass :

- Earth's mass is considered as the biggest mass in the inner planets of the solar system.

Its mass is 5.9×10^{24} kilograms.

Characteristics of the Earth that support the continuity of the life



1 Earth's atmosphere :

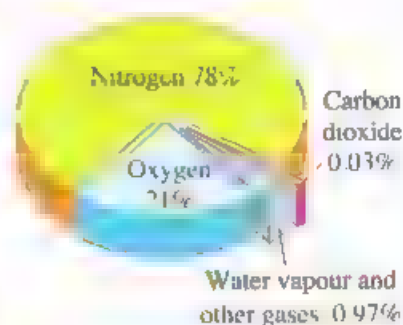
- The Earth is surrounded by an atmosphere as it appears like a white colour around the Earth in the picture captured from the Moon's surface.



The Earth

- The Earth's atmosphere consists of a group of different gases, the following table shows them -

The components of the Earth's atmosphere		Percentage
1	Nitrogen gas.	78 %
2	Oxygen gas.	21 %
3	Carbon dioxide gas.	0.03 %
4	Water vapour.	Variable percentage
5	Other gases	Very little percentage



The major component of the atmosphere is the nitrogen gas

Importance of the Earth's atmosphere :

The gases of Earth's atmosphere have great importance in the continuity of life as follows :

A Importance of oxygen gas :

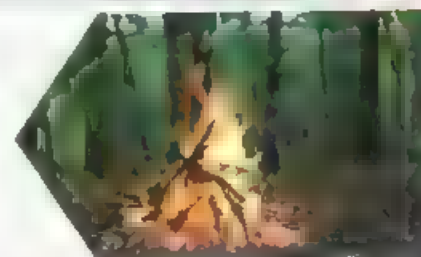
- It is used in respiration process of living organisms.
- It helps in combustion (burning) process of fuels.



1

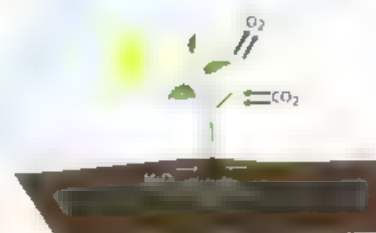
B Importance of nitrogen gas :

- It reduces the effect of oxygen gas during burning processes.
- Plants use it to form proteins.



C Importance of carbon dioxide gas :

It is used by green plants in photosynthesis process to form food for other living organisms including people.





The great expansion of atmosphere in the space helps in :

- Burning millions of small falling meteors completely before reaching the Earth's surface.

2

- Reducing the high speed of large meteorites and burning a part of them before they hit the Earth's surface.

The weather and climate phenomena take place in the atmosphere, such as :

3

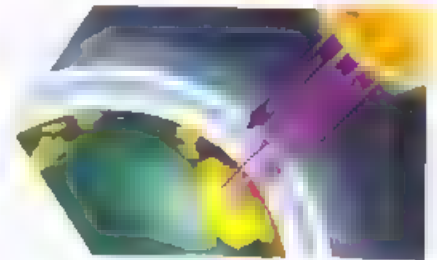
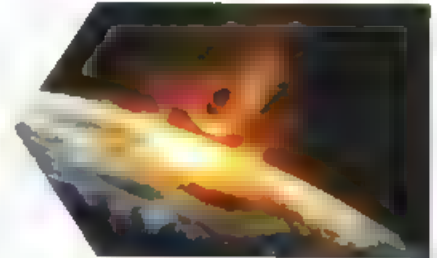
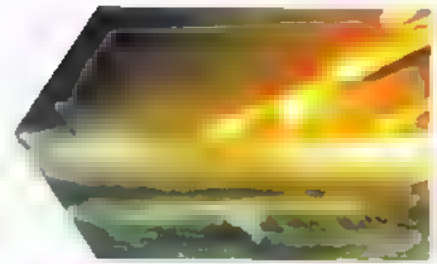
- Wind movement.
- Clouds formation.
- Rain falling to complete the water cycle.

4

It participates in keeping the Earth's temperature suitable for life.

5

It contains ozone layer, which protects living organisms from the harmful ultraviolet rays.



What will happen if ...?

- **Absence of ozone layer in the atmosphere.**

⇒ The ultraviolet rays will reach the Earth's surface and harm living organisms.

- **There is no atmosphere.**

⇒ There will be no life on the Earth's surface and its surface is exposed to destruction due to falling of space bodies on it easily.

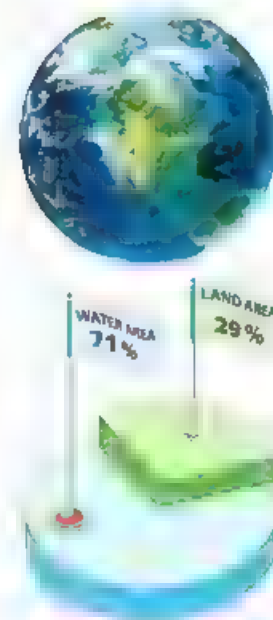
TRY to answer
worksheet
in the Notebook

17

2 Earth's hydrosphere :

The following table shows what the blue and green colours in the opposite natural map of the Earth's surface represent and what is the percentage of each of them in proportion to the Earth?

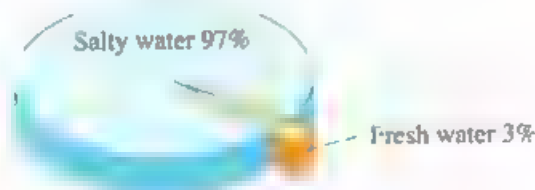
Colour	Represent	Percentage
Blue	Water bodies, such as :	About
	- Oceans.	71%
	- Lakes.	
Green	Land, such as :	About
	- Mountains.	29%
	- Valleys.	



Water is divided into :

A Salty water

B Fresh water



It represents ,

- 97% of water area on the Earth's surface
- 3% of the water area on the Earth's surface.

It exists in ,

- Oceans.
- Seas.
- Rivers.
- Lakes.
- Snow at the two poles.
- Ground water in the pores and cracks of the rocks that form the solid mass of the Earth.

Importance of hydrosphere

1. Water is necessary for the life of all living organisms (plants, animals and human), where :

- * Plants use it in photosynthesis process to form food.
- * Man and animal benefit from it in completing food digestion and absorption processes in the digestive system.
- * It shares in blood formation
- * It keeps the constancy of body temperature.



2. It keeps the temperature on land during day and night within the proper limits of living organisms
3. It represents a suitable environment for large numbers of living organisms, where more than 50% of known living organisms live in the aquatic environments.

3 Suitable temperature :

The temperature on the Earth's surface is suitable for the continuity of life of living organisms at day and night **G.R.**

Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun.

4 Gravity :

The Earth has the force of gravity that makes life continues through :

1. Constancy and steadfastness of objects and living organisms on its surface
2. Steadfastness of the hydrosphere position on its surface.
3. Keeping the Earth surrounded by the atmosphere.

5 Suitable atmospheric pressure :

The Earth is characterized by the presence of suitable atmospheric pressure (air pressure) of about 76 cm Hg. this pressure suits the continuity of life on the Earth's surface.

G.R. *The planet Earth is suitable for life.*

Due to : - The presence of water.

- The presence of the atmospheric envelope containing oxygen gas, which is needed for life.
- Its temperature is suitable during both day and night.
- Its atmospheric pressure and its gravitational force are suitable.

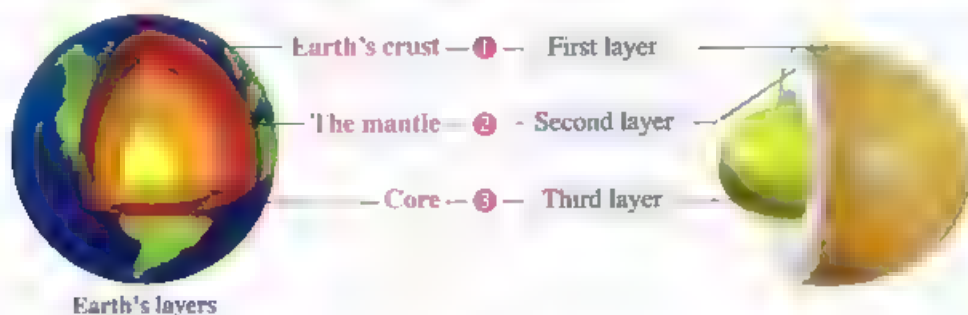
The Inner structure of the Earth

- Scientists think that the inner part of the Earth was in a molten form at its origin **G.R. Due to the high temperature.**
 - As a result of the revolution of the Earth around its centre :
 - * The heaviest metals (iron and nickel) descended towards the centre.
 - * The lightest components in density ascended upwards.
 - This led to the formation of a number of layers.
- Each layer has its own characteristics that distinguish it from the others.



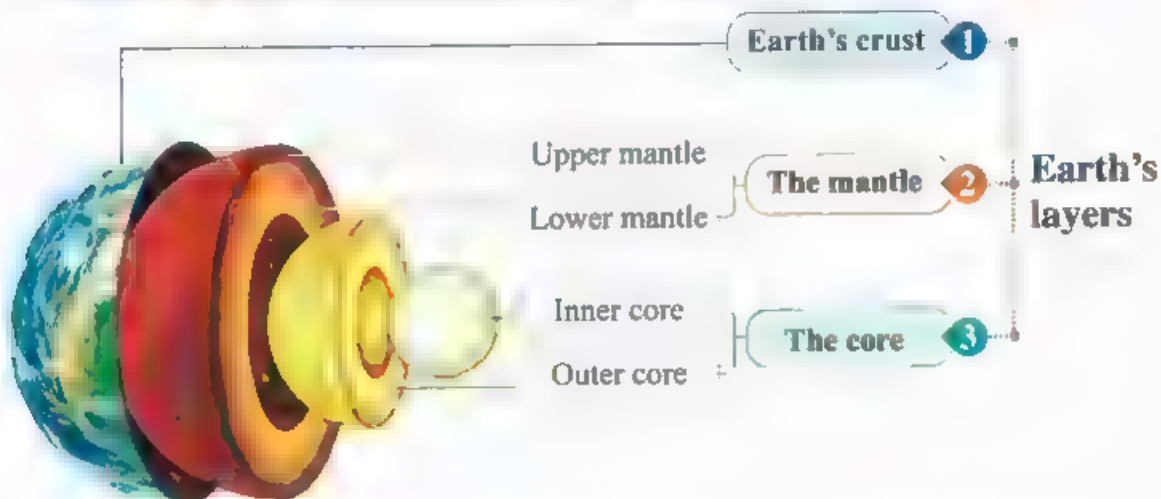
Rotation of the Earth around its centre leads to the formation of Earth's layers.

- The Earth (as the egg) consists of three layers arranged from outside to inside as follows .



Earth's layers

- The following figure and diagram show the layers of Earth :



The Earth's layers

Earth's layers		Formation	Thickness
Earth's crust (The first layer)		It is a relatively light outer layer.	Ranges between 8-60 km approximately.
The mantle (The second layer)		It is a rocky layer.	About 2885 km approximately.
The core (The third layer)	Outer core	It is a layer of molten metals.	About 2100 km approximately.
	Inner core	It is solid layer rich in iron and nickel.	Its radius is about 1350 km approximately.

G.R. *The Earth's inner core is rich in iron and nickel.*
Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.

TRY to answer worksheets **18 & 19**
in the Notebook

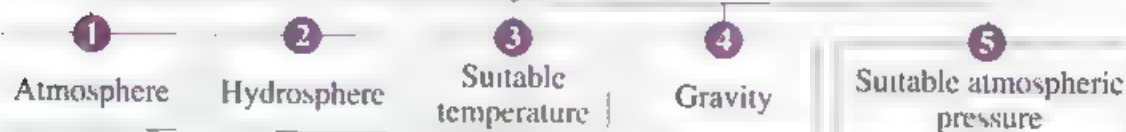
Remember



Lesson Two

- ★ The Earth completes one revolution around the Sun in 365.25 days.
- ★ The distance between the Sun and the Earth is about 150 million kilometres.
- ★ The tropical radius of the Earth is about 22 km larger than the polar radius.
- ★ The average radius of Earth is about 6386 km approximately.
- ★ The Earth's mass is 5.9×10^{24} kilograms.

Characteristics of the Earth that support the continuity of the life :



The Earth's atmosphere consists of :

(A) Oxygen gas :

- Its percentage is 21 % of air volume.
- It is used in respiration process of living organisms.
- It helps in combustion (burning) process of fuels.

(B) Nitrogen gas :

- Its percentage is 78 % of air volume.
- It reduces the effect of oxygen gas during burning processes.
- Plants use it to form proteins.

(C) Carbon dioxide gas :

- Its percentage is 0.03 % of air volume.
- It is used by green plants in photosynthesis process to form food for other living organisms.

(D) Water vapour : Variable percentage.

(E) Other gases : Very little percentage.

Importance of the Earth's atmosphere:

- The great expansion of atmosphere in the space helps in :
 - Burning millions of small falling meteors completely before reaching the Earth's surface
 - Reducing the high speed of large meteorites and burning a part of them before they hit the Earth's surface.
- The weather and climate phenomena take place in the atmosphere, such as
 - Wind movement.
 - Clouds formation.
 - Rain falling to complete the water cycle.
- It participates in keeping the Earth's temperature suitable for life.
- It contains ozone layer which protects living organisms from the harmful ultraviolet rays.

- ★ Water covers about 71 % of the Earth's surface, while land covers about 29 % of the Earth's surface.
- ★ Salty water represents 97 % of the total volume of water, while fresh water represents 3 % of it.
- ★ The normal atmospheric pressure on Earth's surface is about 76 cm Hg
- ★ The Earth consists of three layers arranged from outside to inside as follows :
 1. Earth's crust.
 2. The mantle.
 3. The core.

Questions ?

on lesson Two


● Remember ● Understand ● Apply ● Higher skills ● School book questions



Interactive Exercises

1. Choose the correct answer :

- 1. The Earth completes one revolution around the Sun in _____ days.
a. 24 b. 365.25 c. 150 d. 60
- 2. The Earth is preceded by
a. Mercury and Venus. b. Venus and Mars.
c. Jupiter and Mars. d. Mercury and Mars.
- 3. Earth locates in the solar system regarding its distance from the Sun in the order.
a. third b. fourth c. fifth d. seventh
- 4. Regarding the volume, Earth occupies the _____ order (ascendingly) in the solar system.
a. third b. fourth c. fifth d. eighth
- 5. All of the following are among the characteristics supporting the continuity of life on the Earth, except
a. atmosphere. b. temperature.
c. gravity. d. electromagnetic force.
- 6. The percentage of oxygen gas in the atmospheric air is
a. 0.03 % b. 78 % c. 87 % d. 21 %
- 7. The most abundant gas in the atmospheric air is _____ gas
a. oxygen b. carbon dioxide c. nitrogen d. hydrogen
- 8. Which of the following gases is not considered among the air components ?
a. Oxygen. b. Nitrogen.
c. Carbon dioxide. d. Sulphur dioxide.
- 9. gas reduces the effect of oxygen gas during combustion processes
a. Carbon dioxide b. Nitrogen
c. Hydrogen d. Carbon monoxide
- 10. The percentage of water vapour in air is
a. 21 % b. 0.13 % c. not stable d. 0.03 %
- 11. The great expansion of atmosphere in space helps in
a. burning the small rocky masses before reaching the Earth's surface.
b. reducing the high speed of large meteorites.
c. formation of clouds.
d. (a) and (b) are correct.
- 12. Ozone layer protects life on the Earth by absorbing _____ rays
a. infrared b. visible c. invisible d. ultraviolet

- 13.  Water masses on the Earth's surface form about
 - a. 30 %
 - b. 50 %
 - c. 71 %
 - d. 90 %
- 14 Fresh water represents about of the total volume of water.
 - a. 0.3 %
 - b. 3 %
 - c. 70 %
 - d. 97 %
- 15 The figure that represents the amount of water compared with the area of Earth's surface is .



- 16. is among sources of salty water.
 - a. Snow at the two poles
 - b. Ocean
 - c. River
 - d. Ground water
- 17 More than of known living organisms live in the aquatic environments
 - a. 25%
 - b. 50%
 - c. 10%
 - d. 75%
- 18 The Earth is characterized by the presence of suitable of about 76 cm Hg.
 - a. gravity
 - b. temperature
 - c. air pressure
 - d. hydrosphere
- 19 The Earth's layers are arranged from outside to inside as follows
 - a. crust, core and mantle.
 - b. mantle, crust and core.
 - c. crust, mantle and core.
 - d. core, mantle and crust.
- 20. The inner layer of the Earth is called the
 - a. mantle.
 - b. crust.
 - c. core.
 - d. pole.
- 21. The outer layer of the Earth is called
 - a. crust.
 - b. mantle.
 - c. inner core.
 - d. outer core.
- 22. The thickness of the mantle layer is about km approximately
 - a. 2250
 - b. 2900
 - c. 2885
 - d. 2270
- 23. The layer which consists of molten metals is the
 - a. crust.
 - b. mantle.
 - c. outer core.
 - d. inner core.
- 24. The Earth's inner core contains in a solid state.
 - a. iron and copper
 - b. nickel and copper
 - c. iron and nickel
 - d. copper and aluminium
- 25 The radius of the inner core is about km approximately.
 - a. 50
 - b. 1350
 - c. 2100
 - d. 2885
- 26. is the smallest Earth's layer in thickness.
 - a. Crust
 - b. Inner core
 - c. Mantle
 - d. Outer core



2. Choose from column (B) what suits it in column (A) :

A

(A)	(B)
1. Atmospheric pressure on Earth's surface	a. an outer light layer, its thickness ranging between 8 - 60 km.
2. Earth's crust	b. helps in the steadfastness of the atmosphere and hydrosphere on its surface.
3. Earth occupies in the solar system	c. is about 76 cm.Hg.
4. The force of Earth's gravity	d. third position in view of the distance from the Sun
	e. is rich in iron and nickel.

B

(A)	(B)
1. Carbon dioxide gas	a. forms about 21 % of the air volume.
2. Nitrogen gas	b. forms about 0.97 % of the air volume.
3. Oxygen gas	c. forms about 78 % of the air volume.
4. Water vapour	d. forms about 0.03 % of the air volume.
	e. percentage is unstable.

C

(A)	(B)
1. The Earth's crust	a. contains molten metals.
2. The mantle	b. contains ozone layer.
3. The outer core	c. contains iron and nickel in a solid state.
4. The inner core	d. has thickness that is ranging between 8 - 60 km.
	e. is a rocky layer.

3. Put (✓) or (x) in front of the following statements and correct the wrong one :

1. The Earth is a spherical object. ()
2. Earth's radius between the two poles is larger than that at the equator. ()
3. The Earth is the third planet according to the distance among the Sun. ()
4. The Earth is considered as the biggest mass in the inner planets of the solar system. ()
5. Surrounding the Earth by an atmospheric envelope is among the characteristics supporting the continuity of life on the Earth. ()
6. The atmospheric air is a compound of different gases with the same ratios. ()
7. The percentage of water vapour in air is 0.03 % ()
8. Oxygen gas lessens the effect of nitrogen gas during combustion processes. ()

9. The speed of meteorites increases on friction with air atmospheric molecules. ()
10. The percentage of oxygen gas in air is more than the percentage of nitrogen gas and is less than the percentage of carbon dioxide gas. ()
11. Green plants use carbon dioxide gas in photosynthesis process. ()
12. Hydrogen gas is used by plants to form proteins. ()
13. Ozone layer protects the living organisms from the harmful infrared rays. ()
14. Water covers about 50 % of the Earth's surface. ()
15. The blue colour on the Earth represents the land area. ()
16. Salty water represents about 3 % of the total volume of water. ()
17. The water of oceans is fresh water. ()
18. Water keeps the body temperature constant. ()
19. The steadfastness of the hydrosphere position on the Earth's surface is due to the suitable pressure. ()
20. Air pressure on the Earth's surface is suitable for continuity of life. ()
21. The atmospheric pressure on the Earth's surface is 76 cm Hg. ()
22. Mantle layer lies beneath the Earth's outer core. ()
23. The Earth's inner core is rich in iron and nickel. ()
24. The outer layer of the Earth is known as the mantle. ()
25. The Earth's core is formed of two layers, a molten outer core and a solid inner core. ()
26. The molten metals are found above the layer of Earth's inner core. ()

4. Write the scientific term of each of the following :

1. • The biggest inner planet.
 - The planet which occupies the third position according to the distance from the Sun
 - The planet which occupies the fourth position according to the volume
2. An envelope that surrounds the Earth and consists of a group of different gases.
3. A gas that helps in burning processes.
4. • The most abundant gas in air.
 - A gas that reduces the effect of oxygen gas during burning processes.
5. A gas that is used by green plants in photosynthesis process.
6. A process by which the plant makes its food.
7. The layer of atmosphere, which protects the Earth and living organisms from the harmful ultraviolet radiations.
8. It exists in the pores and cracks of rocks that form the Earth's mass
9. A colourless liquid, the plant uses it in photosynthesis process and the human benefits from it in completing food digestion.




- 10 • It is relatively light outer layer of the Earth, its thickness is ranging between 8 - 60 km
 - The outer layer of the Earth.
- 11 • The layer of the Earth just beneath the Earth's crust and its thickness is about 2885 km.
 - The middle layer of the Earth's layers.
- 12. The layer of the Earth, which is rich in iron and nickel.
- 13. A layer of molten metals with a thickness 2100 km.

5. Complete the following statements :

- 1. The Earth revolves around the Sun by the action of to complete one revolution around the Sun in days.
- 2. The Earth occupies the position according to the distance from the Sun, where it's far from the Sun about km.
- 3. The Earth's shape is to be completely circular accompanied with at the two poles and at the equator.
- 4 The radius of the Earth is about 22 km larger than the radius.
- 5. Concerning the volume, the Earth is the biggest , planet.
- 6. The average radius of the Earth is about , while its mass is ,
- 7. and are among the characteristics of the Earth supporting the continuity of life.
- 8. The atmospheric envelope appears as a colour around the Earth.
- 9. The percentage of carbon dioxide gas in the atmospheric air is , while the percentage of oxygen gas is
- 10. The major component of the atmosphere is gas and it occupies about of the air volume.
- 11. 🌿 Green plants use gas in photosynthesis process.
- 12. gas is used in combustion processes of fuels, while ... gas is used by plants to form proteins.
- 13. ... gas controls the effect of oxygen gas during combustion processes
- 14 The layer in the atmospheric air protects living organisms from harmful rays
- 15. and rain falling are from the weather and climate phenomena
- 16. The great expansion of atmosphere in the space helps in and
- 17. Water covers about of the Earth's surface, 97% of it is water, and 3% of it is water.
- 18. and are among the sources of fresh water, while and are among the sources of salty water.
- 19. 🏠 Ground water exists in the of the rocks that form the Earth's mass.

- 20. shares in blood formation and stabilizing the body
- 21. The normal atmospheric pressure on the Earth's surface is about .
- 22. The Earth consists of a number of arranged layers from the surface to the centre :
The crust, and
- 23. The outer layer of the Earth is called and the next one is called
- 24. is the smallest Earth's layer in thickness, while is the biggest Earth's layer in thickness.
- 25. The thickness of the Earth's crust ranges from to
- 26. The Earth's core is divided into core and core.
- 27. and are among heavy metals that are collected around the centre of the Earth.

6. Give reasons for each of the following :

1. The tropical radius is larger than the polar radius.
2. Concerning the volume, the Earth occupies the medium position in the solar system.
3. The presence of a white colour surrounds the Earth.
4. Some rocky masses that fall from the space don't reach the Earth's surface.
5. Importance of ozone layer.
6. Temperature on the Earth's surface suits the life of living organisms.
7. Steadfastness of the hydrosphere on the Earth's surface.
8. Keeping the Earth surrounded by the atmosphere.
9. The presence of life on the surface of the Earth planet only
10. Earth's gravity makes life continue.
11. The Earth consists of many layers, each layer has its own characteristics.
12. Scientists think that the inner part of the Earth was in a molten form.
13. •  The Earth's inner core is rich in iron and nickel.
• Iron and nickel elements are collected around the centre of the Earth

7. What is the number indicating each of the following ?

1. The difference between the tropical radius and the polar radius.
2. The periodic time for revolution of the Earth around the Sun.
3. The distance between the Sun and the Earth.
4. The average radius of the Earth.
5. The average mass of the Earth.
6. The percentage of nitrogen gas in the atmospheric air.
7. The percentage of oxygen gas in the atmospheric air.



8. The percentage of carbon dioxide gas in the atmospheric air.
9. The percentage of water bodies concerning the area of Earth's surface.
10. The percentage of salty water concerning the area of water bodies.
11. The percentage of fresh water concerning the area of water bodies.
12. The normal air pressure.
13. The thickness of the Earth's crust.
14. The thickness of the mantle layer.
15. The thickness of the outer core of the Earth.
16. The thickness of the inner core of the Earth.
17. The thickness of the core of the Earth.

8. What is the importance of ... ?

1. Oxygen gas.
2. Nitrogen gas.
3. Carbon dioxide gas.
4. The atmosphere [related to the protection of Earth from space rocks].
5. The atmosphere [related to the temperature of Earth].
6. Ozone layer.
7. Water in continuity of life on the Earth (three points only).
8. Gravity in continuity of life on the Earth.
9. The Earth is located in the middle position related to the Sun

9. What do you expect in the following cases ... ?

1. The air contains oxygen gas and is free of nitrogen gas.
2. There is no atmosphere.
3. Absence of ozone layer in the atmosphere.
4. The Earth loses its gravity.

10. Compare between :

1. Oxygen, nitrogen and carbon dioxide gases.
[Concerning : The percentage of the presence of them in the air – Importance].
2. Nitrogen and carbon dioxide gases [Concerning : The importance of each of them for plants].
3. Water bodies and land on the Earth's surface.
4. Salty water and fresh water.
5. The crust and the mantle.
6. Inner core and outer core.

11. Variant questions :

- 1 Describe the planet Earth through :
 1. Its shape.
 2. Its volume.
 3. Its mass.
 4. The time of revolution around the Sun.
- 2 Mention the characteristics supporting the continuity of life on the Earth planet.
- 3 Explain with drawing the inner structure of the Earth.
- 4 Arrange :
 - 1 The components of atmospheric air descendingly concerning the percentage of their presence.
 - 2 The following Earth's layers from inside to outside.
(Lower mantle – Crust – Inner core – Upper mantle – Outer core).

12. Study the following figures, then answer the questions :

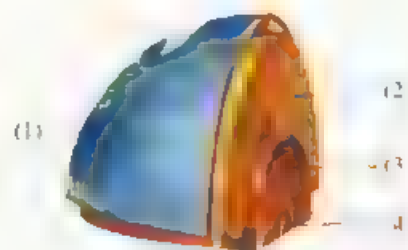
- 1 In front of you, a part of a boiled egg. The contents of that egg is similar to the Earth's layers, where :

- 1 The yolk (yellow part of the egg) represents
- 2 The white part of the egg represents
- 3 The shell of the egg represents ...



- 2 Look at the opposite figure, which represents a section in the Earth, then answer the following questions :

1. Label the numbered items.
2. Molten metals are found in layer number ...
3. The thickness of layer number (3) is about ... , while that of layer number (4) is about ...
4. The layer number (4) contains iron and ... in a ... state.

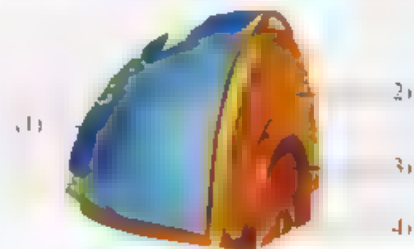


Thinking Skills

Questions

1. Choose the correct answer :

- The ratio of the blue colour to that of the green colour in the world natural map of the Earth's surface is one.
 - more than
 - less than
 - equal to
 - no correct answer
- The ratio between the density of the Earth's core to that of the Earth's crust is one.
 - more than
 - less than
 - equal to
 - no correct answer
- The Earth consists of four layers as in the opposite figure. From which the layer No (2) is formed ?
 - A solid rock.
 - A solid metal.
 - A molten rock
 - A liquid metal.

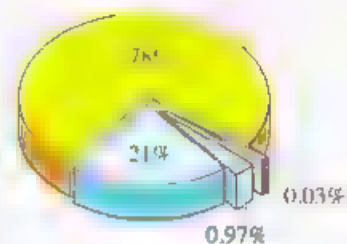


2. What do you expect in the following cases if ...?

- The Earth's atmosphere doesn't contain oxygen gas.
- The air pressure increases more than 76 cm.Hg.

3. The opposite figure represents the percentage of gases formed the atmosphere. Mention :

- The name of these gases according to the percentages presented on the figure.
- The importance of the gas whose percentage is 78% for living organisms.



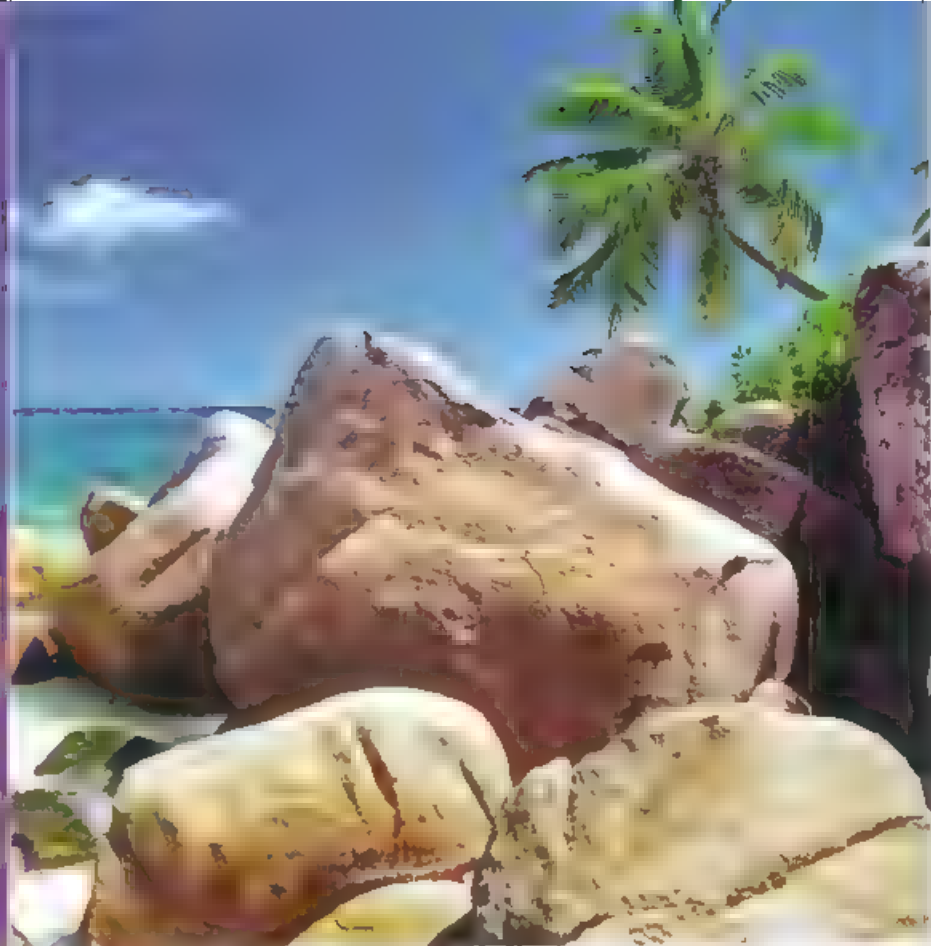
4. Hadeer discussed with the science teacher about the characteristics of the planets, he assumed that, there is a planet called (Proto) is located in a group other than our solar system and it is characterized by :

- * The oxygen percentage in the atmosphere is about 5 %
- * The carbon dioxide percentage in the atmosphere is about 90 %
- * There is no ozone layer on it.
- * There is no clouds on it.

Then he asked her : Is there a life on this planet ?

What do you expect the answer of Hadeer, then explain your answer ?

Rocks and Minerals



What are the types of rocks that present in the Earth's crust?

- From the previous lesson, you know that :
 - The Earth consists of three layers.
 - The outer layer is called the Earth's crust.
- Scientists classified the Earth's crust into two main parts which are :
 1. The soil.
 2. The solid basis.



The structure of the Earth's crust

Components of the Earth's crust

1 The soil

Soil

It is a thin non-compacted layer, which covers the Earth's crust

- It is **superficial** (upper) layer of the Earth's crust
- It is a thin, fragmented and loosened layer.
- It **consists of** a mixture of mineralogical substances, water, air, decayed organic materials and plant roots.

2 The solid basis

Rock

It is a natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.

- It is **lower layer** of the Earth's crust beneath the soil.
- It **consists of** different types of rocks.



G.R. *The plant roots extend easily through the upper part of the Earth's crust but can't extend through its lower part.*

Because the upper part is fragmented and loosened layer but the lower part is a solid material, that consists of different types of rocks.

Classification of rocks

Rocks are classified according to their way of formation into three groups, the following diagram shows them :



FIRST The igneous rocks



- You knew from the previous lesson, the outer core of the Earth contains molten metals, which are known as magma.

Magma

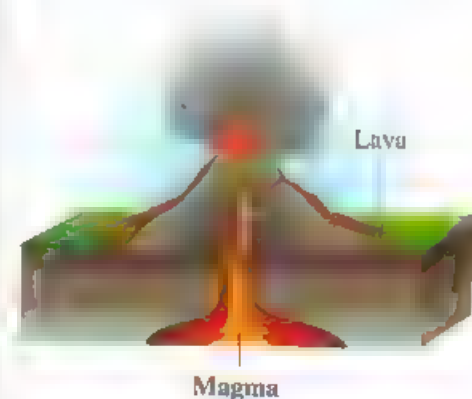
It is a very hot thick (viscous) liquid underneath the Earth's crust

- When a volcano occurs, the magma at the bottom of the Earth's crust is pushing upwards.
- A part that fills some gaps and cracks of the Earth's crust and the other part is extruded from the crater of volcano to the surface of the Earth in the form of volcanic flows, which is known as lava.

Lava

Or

- It is the magma when it reaches the Earth's surface.
- It is the volcanic flows that spread on the volcanic sides.



- When magma and lava cool and solidify, they form the igneous rocks

Igneous rocks

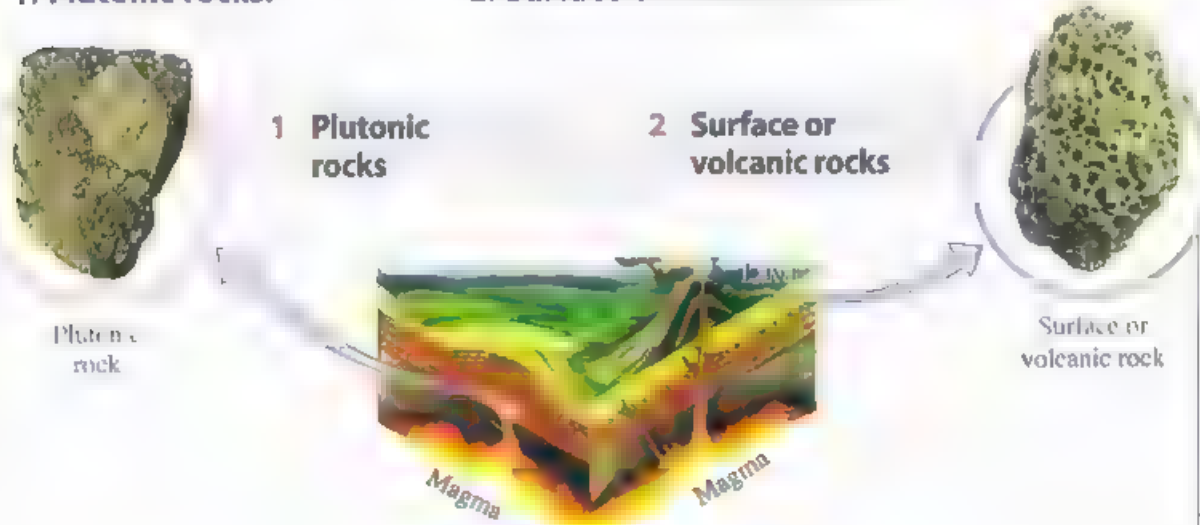
They are rocks formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.

Types of igneous rocks

Igneous rocks can be divided according to the site (place) of their formation in proportion to the Earth's surface into two main divisions, which are :

1. Plutonic rocks.

2. Surface or volcanic rocks.



Ways of formation ,

The magma at the depths of the Earth's crust gets cool slowly, therefore the minerals that form these rocks take a long time to crystallize, so their crystals are large-sized.

The lava cools quickly on the surface of the Earth's crust, therefore the minerals that form these rocks take a short time to crystallize, so their crystals are small-sized.

Texture

They have coarse texture **G.R.**
Because the size of crystals of minerals forming them is large.

They have smooth texture **G.R.**
Because the size of crystals of minerals forming them is small.

Places of formation ,

They are formed in the depth of the Earth's crust, where the minerals accumulate forming huge masses of rocks covering wide areas.

They are formed over the Earth's surface, where the minerals accumulate forming a flow of lava around the sides of volcano.

G.R. | *The volcanic rocks contain small circular holes.*

Due to the extruding of gases from volcanic flows during their cooling and formation of rock.



Examples of igneous rocks :



A Granite

It is a plutonic igneous rock.

Pink or grey.

The crystals of minerals forming it are big (can be seen by the naked eye).

Kind

Colour

Size of crystals

Properties

- It is heavy.
- It has rough texture.
- It is solid, cohesive and it isn't easily broken.

Found in

- The Eastern Desert.
- Sinai Peninsula.

Minerals forming it

It consists of 3 main minerals, which are :



B Basalt

It is a volcanic igneous rock.

Dark coloured.

The crystals of minerals forming it are small (can't be seen by the naked eye).

- It has small circular holes.
- It has smooth texture.
- It is extremely hard.

- Egypt in Abou-Zaabal.

- El-Fayoum.

- Near Abou Rawash.

It consists of 3 main minerals, which are :



TRY to answer
worksheet
in the Notebook

20

SECOND

The sedimentary rocks

- They represent about 5% only of the total volume of the Earth's crust rocks.
- They form a thin cover, that wraps about 75% of the surface of the Earth's solid mass.



Layers of sedimentary rocks

Formation of sedimentary rocks



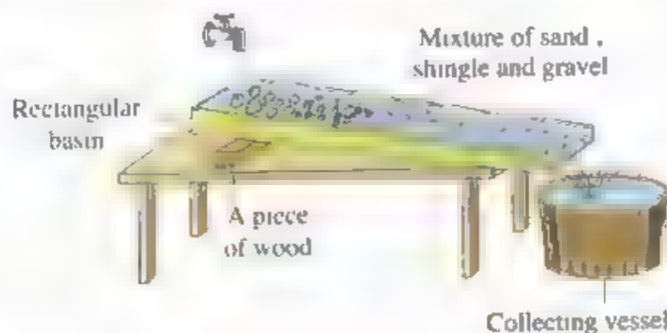
The following activity shows how the sedimentary rocks are formed.

Activity • To show transportation and deposition processes.

Steps:

- Bring a rectangular basin and place it in an inclined position
- Put a mixture of sand, shingle and gravel at its upper part.
- Pour water upon this mixture.

What do you notice when increasing the speed of water current ?



Observations:

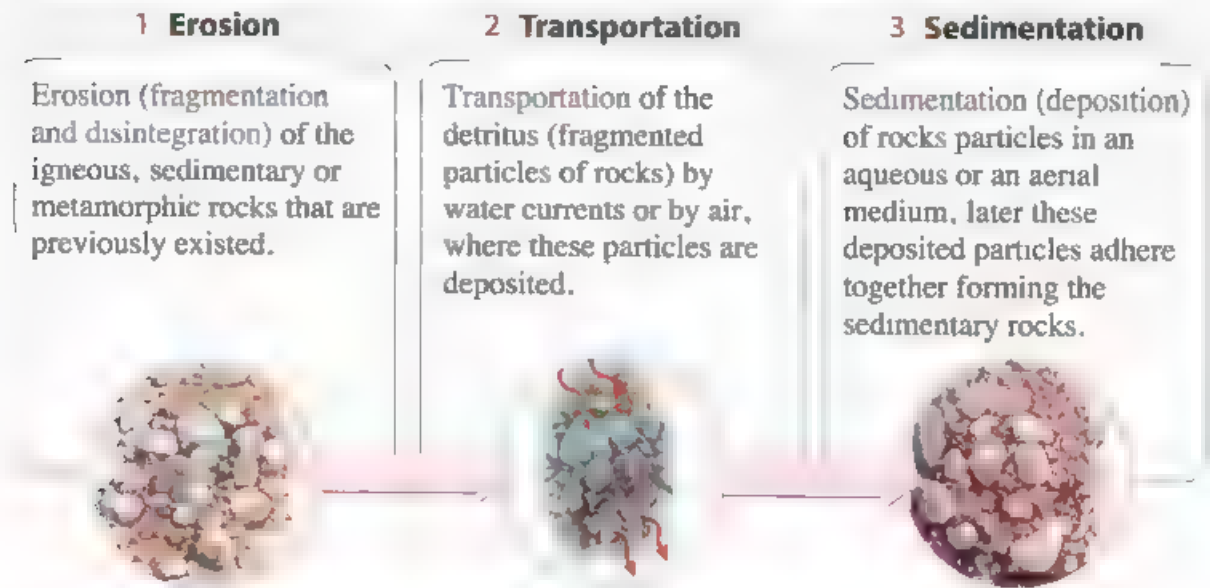
- Water takes the smooth sand on its way and the sand deposits in the collecting vessel, while shingle and gravel remain in the rectangular basin.
- If the speed of water increases, the size of the transported grains increases.

Similarly:

The water currents in seas and rivers transport the fragmented particles of rocks and deposit them above each other in the form of layers



* Formation of sedimentary rocks takes place in three successive stages, which are :



☞ From the previous explanation, we can define the sedimentary rocks as follows

...Sedimentary rocks

- They are rocks formed from the cohesion of sediments.
- Or – They are rocks formed from fragmentation and sedimentation of old rocks.

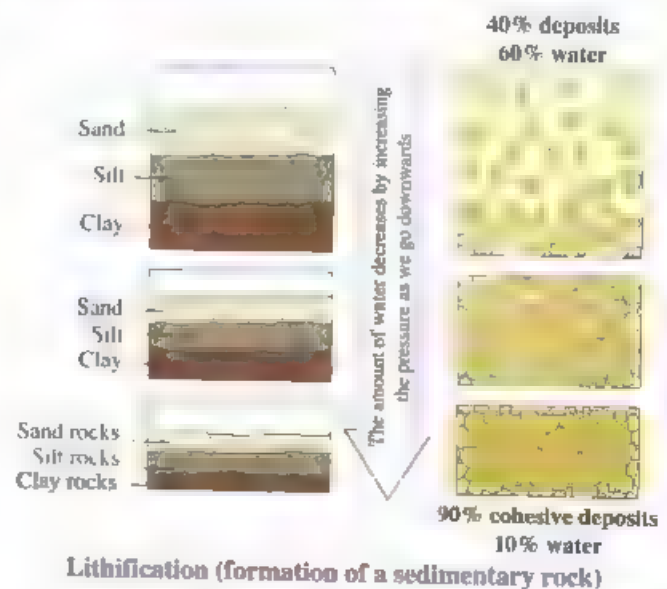
What are the results based on?

Increasing the pressure on the grains of rocks.

- ☞ The cohesion of the grains of rocks increases by passing time forming layers above each other, the layers in the bottom are older and the above ones are more recent

G.R. *The cohesion of layers of sedimentary rocks increases by passing time.*

Because the sediments of the bottom layers are exposed to high pressure resulted from the weights of the deposits above them, this causes a decrease in the ratio of water existing between the grains.



Examples of sedimentary rocks :

A Sandstone

B Limestone

Composition	
It consists of sand grains that are less than 2 mm in diameter.	It consists of the precipitation of calcium carbonate (CaCO_3) in lime solutions.
Minerals forming it	
The main component almost is quartz mineral.	It consists of mineral calcite (calcium carbonate).
Colour	
Yellow.	White.
Texture	
Coarse.	Smooth.
Coherences	
Cohesive.	Less cohesive.
Shape	
It has thin layers.	It has thin layers.

How can you differentiate between sandstone and limestone ?

To differentiate between	Sandstone	Limestone
By adding dilute hydrochloric acid to each of them.	No reaction takes place.	A chemical reaction takes place with an effervescence G.R. <i>Due to evolving of carbon dioxide gas.</i>

What are the results based on?

Calcium carbonate precipitates in lime solutions.

☞ Limestone is formed.

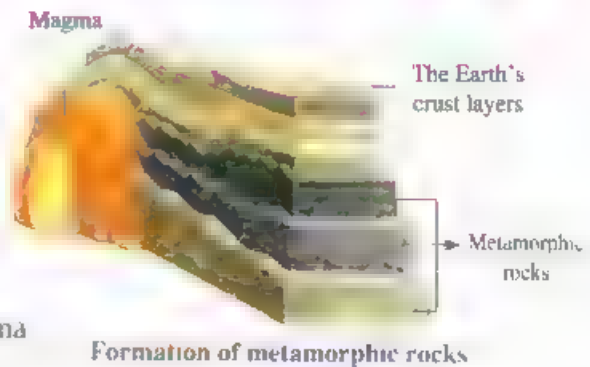


THIRD

The metamorphic rocks



- When old rocks (igneous or sedimentary) are subjected to pressure and high temperature, they convert into metamorphic rocks.
- This conversion often takes place in the rocks, that the magma interferes within them and this conversion **depends on** :
 1. The mass of magma and its temperature.
 2. The type of rock which surrounds the magma



Metamorphic rocks

They are rocks originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature

Example of metamorphic rocks :

Marble

Composition : - It is produced from the conversion of *limestone*.

Coherences : - It has more solidity and cohesive than the limestone.

Texture : - Its texture is coarse (rough).

Colour : - Its colour is white if it is pure and has other colours when it contains impurities.



White marble



Coloured marble

* The following diagram shows the changes of rocks :



TRY to answer worksheet

- General Exercise of the School Book on Unit 3
- Model Exams on Unit 3 in the Notebook

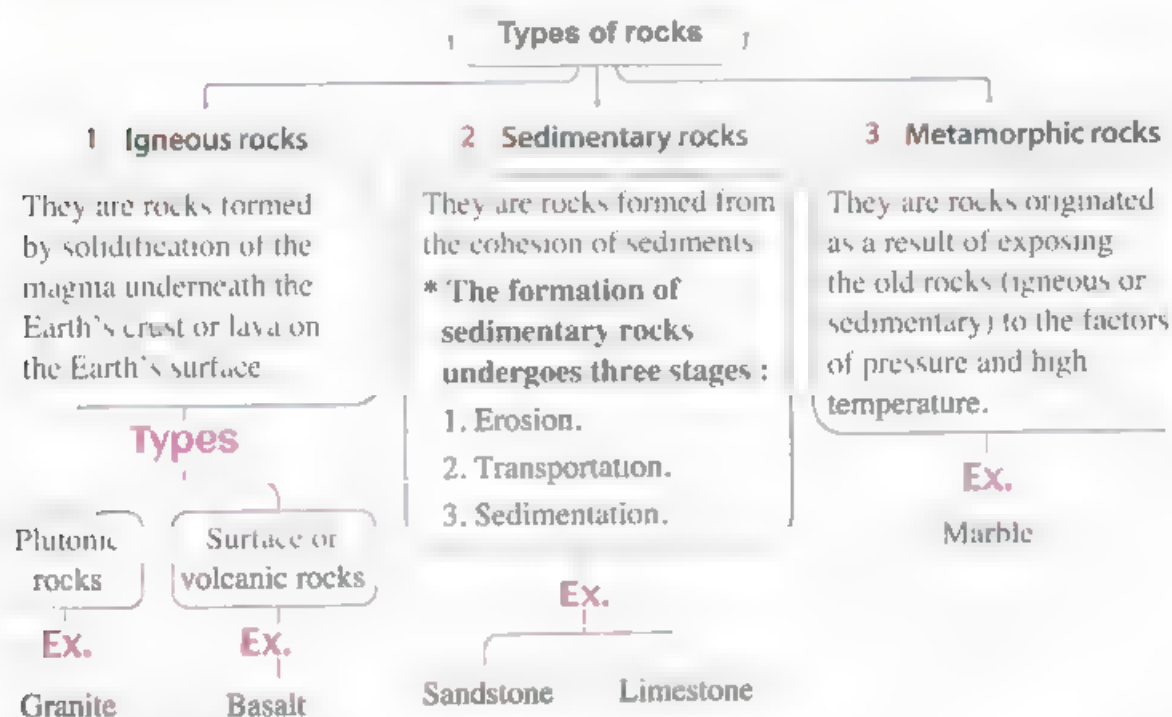
21

Remember



Lesson Three

- ★ **Soil** : It is a thin non compacted layer, which covers the Earth's crust
- ★ **Rock** : It is a natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.
- ★ **Magma** : It is a very hot thick (viscous) liquid underneath the Earth's crust
- ★ **Lava** : It is the magma when it reaches the Earth's surface.



★ Comparison between granite rock and basalt rock :

Points of comparison	Granite rock	Basalt rock
1. Kind :	Plutonic igneous rock.	Volcanic igneous rock.
2. Colour :	Pink or grey.	Dark in colour.
3. Size of crystals :	Can be seen by naked eye	Cannot be seen by naked eye
4. Found in :	The Eastern Desert and Sinai Peninsula.	Egypt in Abou Zaabal, near Abou-Rawash and El-Fayoum.
5. Minerals forming it :	Quartz, mica and feldspar	Olivine, pyroxene and feldspar.

Questions ?

on Lesson Time

Remember Understand Apply Higher skills School book questions



Interactive Exercises

1. Choose the correct answer :

1. The superficial layer of the Earth's crust is layer.
a. thick b. rocky c. loosened d. unfragmented
2. The soil consists of ..
a. minerals, water and air only. b. plant roots only.
c. decayed organic materials only. d. all of the previous answers.
3. The igneous rocks are formed of molten material underneath the Earth's crust, which is called
a. magma. b. lava. c. core. d. mantle.
4. Igneous rocks are divided according to the site of formation in the Earth's surface into rocks.
a. sandstone and limestone b. marble and limestone
c. plutonic and volcanic d. granite and basalt
5. The volcanic flows is known as
a. magma. b. lava. c. core. d. mantle.
6. Plutonic igneous rocks consist of solidification of
a. magma only. b. lava only.
c. volcanic flows only. d. (a) and (b) are correct.
7. rock is characterized by that it is heavy, rough, solid, cohesive and it isn't easily broken.
a. Basalt b. Marble c. Limestone d. Granite
8. All of the following are minerals, that form granite rock, except
a. quartz. b. olivine. c. mica. d. feldspar.
9. is a volcanic rock, which is formed of lava when it cools on the Earth's surface.
a. Basalt b. Granite c. Marble d. Sandstone
10. is from plutonic igneous rocks.
a. Basalt b. Marble c. Granite d. Limestone
11. All of the following are minerals, that form the basalt rock, except
a. pyroxene. b. olivine. c. feldspar. d. mica.
12. Basalt is characterized by that, it has ..
a. small circular holes. b. grey colour. c. glassy luster d. prism shape.
13. Sedimentary rocks form a thin cover that wraps about of the surface of the Earth's solid mass.
a. 5% b. 75% c. 71% d. 57%

14. When you pass a weak stream of water in the basin by a mixture of gravel, sand and shingle, the water takes on its way
- grains of smooth sand.
 - grains of sand and shingle.
 - pieces of gravel.
 - all of the previous answers.
15. The sequence of sedimentary rocks formation is
- erosion – sedimentation – transportation.
 - erosion – transportation – sedimentation.
 - sedimentation – erosion – transportation.
 - transportation – erosion – sedimentation.
16. are examples of sedimentary rocks.
- Granite and basalt
 - Marble and sandstone
 - Sandstone and limestone
 - Basalt and limestone
17. The main component of sandstone is
- quartz mineral.
 - feldspar mineral.
 - mica mineral.
 - all of the previous answers.
18. is yellow in colour and has a coarse texture.
- Sand
 - Sandstone
 - Limestone
 - Granite
19. Limestone has a
- white colour with coarse texture
 - yellow colour with coarse texture.
 - yellow colour with smooth texture
 - white colour with smooth texture.
20. Limestone consists of precipitation of
- magnesium carbonate
 - calcium sulphate
 - calcium carbonate
 - magnesium sulphate
21. gas evolves when hydrochloric acid reacts with limestone
- Carbon monoxide
 - Carbon dioxide
 - Hydrogen
 - Oxygen
22. We can differentiate between sandstone and limestone by
- dil. hydrochloric acid (HCl).
 - colour.
 - texture.
 - all of the previous answers.
23. The metamorphic rock is produced as a result of the effect of the heat and pressure on the rocks.
- igneous only
 - sedimentary only
 - metamorphic only
 - (a) and (b) are correct
24. is produced from conversion of limestone.
- Granite
 - Marble
 - Basalt
 - Sandstone
25. has a white colour when it is pure and coarse texture.
- Marble
 - Limestone
 - Sandstone
 - Granite



2. Choose from column (A) what suits it in column (B) :

1	(A)	(B)
	1. Igneous rocks	a. is marble.
	2. Sedimentary rocks	b. are formed from the molten matter under the Earth's crust.
	3. An example of metamorphic rocks	c. are formed from the cohesion of sediments.
		d. are formed due to the tide.

2	(A)	(B)
	1. Granite	a. consists of mineral calcite.
	2. Basalt	b. consists of quartz and olivine minerals.
	3. Limestone	c. consists of quartz, feldspar and mica minerals.
		d. consists of olivine, pyroxene and feldspar minerals.

3. Choose from column (A) what is suitable for columns (B) and (C) :

(A)	(B)	(C)
1. Basalt	a. is a dark coloured rock	A. and is an example of metamorphic rocks.
2. Limestone	b. has a coarse texture	B. and is an example of igneous rocks.
3. Marble	c. is yellow in colour	C. and is an example of sedimentary rocks.
	d. has a smooth texture	D. and is an example of calcareous rocks.

4. Put (✓) or (x) in front of the following statements and correct the wrong ones :

- 1. The solid basis of the Earth's crust is unfragmented. ()
- 2. The plant roots extend easily through the solid basis of the Earth's crust. ()
- 3. The mineral consists of one rock or a group of rocks. ()
- 4. The magma is pushed upwards on occurrence of earthquake. ()
- 5. The minerals that form the volcanic rock have large-sized crystals. ()
- 6. The types of igneous rocks are plutonic and volcanic rocks. ()
- 7. When the lava cools, it forms a type of sedimentary rocks. ()
- 8. The volcanic rocks are characterized by small size of their crystals and contain small circular holes. ()
- 9. Granite is a sedimentary rock. ()
- 10. Basalt is a volcanic rock. ()
- 11. We can differentiate between granite and basalt concerning the colour and texture. ()

- 12 Granite exists in the Eastern Desert and Sinai Peninsula, while basalt exists in Egypt in Abou-Zaabal. ()
- 13 The sedimentary rocks represent about 5% only of the total volume of the Earth's crust rocks. ()
- 14 On the formation of sedimentary rocks, the size of transported grains decreases by increasing the speed of water currents. ()
- 15 The above layers in sedimentary rocks are the oldest. ()
- 16 Quartz mineral is one of the main components in granite rock ()
- 17 Limestone exists as thin layers. ()
- 18 Limestone is formed due to the precipitation of calcium bicarbonate in lime solutions. ()
- 19 Carbon monoxide gas evolves when hydrochloric acid reacts with limestone. ()
- 20 Although marble is produced from the conversion of limestone, but it has more solidity than it. ()
- 21 Sandstone and marble are examples of metamorphic rocks ()
- 22 The coloured marble is free from impurities. ()

5. Write the scientific term of each of the following statements :

- 1. A thin non-compacted layer, which covers the Earth's crust.
- 2. A natural solid material, that exists in the Earth's crust and it consists of one mineral or a group of minerals.
- 3. A molten material, that exists at depths beneath the crust.
- 4. ● Magma, when it reaches the Earth's surface.
 - The volcanic flows that spread on the volcanic sides.
- 5. Rocks are formed by solidification of magma underneath the Earth's crust or lava on the Earth's surface.
- 6. ● A rock formed of lava flows when it comes on the Earth's surface
 - A rock formed from quick cooling of lava on the surface of the Earth's crust.
- 7. ● The rocks that are formed from slow cooling of magma at the depth of the Earth's crust
 - Igneous rocks which have a coarse texture and large-sized crystals
- 8. A rock which has a pink or grey colour and found in the Eastern Desert.
- 9. A rock which has a dark colour and found in Abou-Zaabal and El-Fayoum
- 10. ● Rocks that are formed of the fragmentation and sedimentation of old rocks
 - Rocks formed from the cohesion of sediments.
 - Rocks that form a thin cover, that wraps about 75% of the surface of the Earth's solid mass
- 11. A rock that consists of sand grains that are less than 2 mm in diameter.
- 12. A sedimentary rock which has the same chemical structure of marble.
- 13. Rocks that are formed when old rocks (igneous or sedimentary) are subjected to pressure and high temperature.



6. Complete the following statements :

- 1. The Earth's crust consists of two main parts, which are _____ and _____.
- 2. _____ is a thin _____ layer, which covers the Earth's crust.
- 3. The soil consists of a mixture of _____, _____, air, decayed _____ materials and plant roots.
- 4. Rocks are classified according to the way of formation into _____, _____ and _____ rocks.
- 5. _____ The molten material that exists beneath _____, which is extremely hot thick fluid in the Earth's interior is known as _____ and after its going out to the Earth's surface in the form of _____, it is called _____.
- 6. Igneous rocks are divided according to the site of their formation in the Earth's surface into _____ and _____.
- 7. Plutonic rocks have crystals with _____ size, while volcanic rocks have crystals with _____ size.
- 8. _____ and _____ are examples of igneous rocks.
- 9. Granite is from _____ igneous rocks, while basalt is from _____ igneous rocks.
- 10. _____ is a pink or grey coloured rock, while _____ is a dark coloured rock.
- 11. _____ Granite rock consists of _____, _____ and _____ minerals, while basalt rock consists of _____, _____ and _____ minerals.
- 12. _____ Sedimentary rocks form a thin cover that wraps about _____ of the Earth's surface although they represent _____ of the total volume of the Earth's crust rocks.
- 13. Sedimentary rocks are formed as a result of _____, _____ and _____.
- 14. The successive layers of sedimentary rocks are sediments in an _____ or an _____ medium.
- 15. _____ and _____ are examples of sedimentary rocks.
- 16. The colour of limestone is _____ and its texture is _____, while the colour of sandstone is _____ and its texture is _____.
- 17. The main component of sandstone is _____ mineral.
- 18. Limestone is formed due to the precipitation of _____ in _____ solutions.
- 19. _____ consists of sand grains, that are less than _____ in diameter.
- 20. We can differentiate between limestone and sandstone by using _____ acid.
- 21. _____ mineral consists of calcium carbonate, which is expressed by a formula is _____.
- 22. When hydrochloric acid is added to limestone, _____ gas is evolved.

- 23. When _____ and _____ rocks are subjected to pressure and high temperature, they transform into _____ rocks.
- 24. The effect of magma when it interferes in the cracks of the Earth's crust rocks depends on the _____ of magma and its temperature, and the type of _____ which surrounds it.
- 25. Marble is resulted from transformation of _____

7. Give reasons for each of the following :

- 1 The plant roots extend easily through the upper part of the Earth's crust, but can't extend through its lower part.
- 2 The crystals of minerals that form the plutonic igneous rock are large-sized.
3. The crystals of minerals that form the volcanic rock are small-sized
4. Volcanic rocks contain small circular holes.
5. Granite has a coarse texture, while basalt has a smooth texture.
- 6 The components of granite rock can be seen by the naked eye
7. The components of basalt rock cannot be seen by the naked eye
8. Limestone consists of mineral calcite.
- 9 Effervescence takes place when hydrochloric acid is added to a sample of limestone
- 10 The cohesion of layers of sedimentary rocks increases by passing time
- 11 We can differentiate between the sandstone and limestone from colour and texture.
12. Some kinds of marble are coloured and others are white.

8. What are the results based on ... ?

1. The magma comes out of the Earth's surface.
2. Decreasing the temperature of lava on the Earth's surface rapidly
3. Decreasing the temperature of magma in the depths of the Earth's crust slowly.
- 4 The minerals that form the plutonic igneous rocks take a long time for crystallization.
- 5 The minerals that form the volcanic igneous rocks take a short time for crystallization.
- 6 Extruding of gases from volcanic flows, which form the volcanic rocks.
- 7 You pour a stream of water on a mixture of sand, shingle and gravel put in a rectangular basin.
8. Increasing the pressure on the grains of rocks forming the layers of sedimentary rocks
9. You add hydrochloric acid to limestone.
- 10 Sedimentary rocks are subjected to pressure and high temperature.
- 11 Melting of limestone by high temperature, then re-crystallization of the minerals forming it gradually.
12. Calcium carbonate precipitates in lime solution.




9. What is meant by ... ?

- | | |
|-----------------------|-----------------------|
| 1. Soil. | 2. Rock. |
| 3. Magma. | 4. Lava. |
| 5. Igneous rocks. | 6. Sedimentary rocks. |
| 7. Metamorphic rocks. | |

10. Choose the odd word out, then write the scientific name of the rest :

1. Quartz – Mica – Basalt – Feldspar.
2. Olivine – Pyroxene – Feldspar – Mica.
3. Quartz – Calcite – Mica – Feldspar.
4. Erosion – Solidification – Transportation – Sedimentation.

11. Compare between :

1. The soil and the solid basis.
2. Plutonic and volcanic rocks.
3. Magma and lava.
4. Granite and basalt.
5.  The sandstone rock and the limestone rock.
6. Igneous, sedimentary and metamorphic rocks.

12. Write the names of the rocks that are characterized by each of the following :

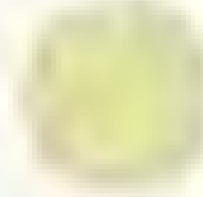
1. • An igneous rock has a rough texture and its colour is pink or grey.
• A rock consists of quartz, feldspar and mica minerals.
2. • A specimen of rocks consists of feldspar, olivine and pyroxene minerals.
• A volcanic igneous rock has a dark colour, it has small circular holes and its components cannot be seen by the naked eye.
3. A sedimentary rock has a coarse texture, whose colour is yellow and it consists of sand grains.
4. A sedimentary rock has a smooth texture, whose colour is white and it consists of mineral calcite.
5. • A rock that is produced from the conversion of limestone.
• A rock that has a rough texture, its colour is white if it is pure and it has more solidity and cohesive than the limestone.

13. Variant questions :

1. Classify the Earth's rocks according to their way of formation.
2. Classify the igneous rocks according to the site of their formation.
3. What are the stages of formation of sedimentary rocks ?
4. Which of the following rocks is sedimentary, igneous or metamorphic ?
1. Marble. 2. Granite. 3. Limestone. 4. Sandstone. 5. Basalt.
5. Mention the main minerals, that share in the structure of the following rocks
1. Granite. 2. Basalt. 3. Limestone.
6. What are the characteristics we depend on to distinguish between the plutonic igneous rocks and the volcanic igneous rocks ?
7. What are the main factors that lead to the formation of the metamorphic rocks ?
8. How can you distinguish by an experiment between sandstone and limestone ?
9. Give an example of each of the following :
1. An igneous rock. 2. A sedimentary rock.
3. A metamorphic rock.
10. The opposite figures show two samples of igneous rocks, answer the following questions :
1. What is the type of rock (A) and rock (B) ?
2. What is the scientific evidence relied upon to distinguish between them ?
3. Give an example of each type.
11. Blocks of limestone used in building are rapidly by the effect aerial factors, comparing with marble, although that marble is produced from the conversion of limestone and chemical structure of each of them is similar. **What is your scientific explanation for that ?**



Rock (A)



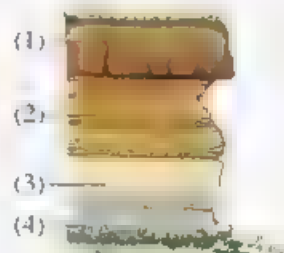
Rock (B)

Thinking Skills

Questions

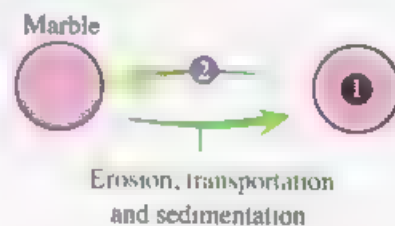
1. Choose the correct answer :

- During the volcanic eruption, the magma moves towards the Earth's surface and becomes volcanic flows. In which layer from Earth's layers, the magma is formed ?
 a. The crust. b. The mantle. c. Inner core. d. Outer core.
- Some volcanic rocks have many holes in them. How were the holes made ?
 a. Insects dug into the rock when it was soft.
 b. Gas bubbles were trapped in the rock when it cooled.
 c. Rain dropped on the rock when it was soft.
 d. Small stones fell out of the rock when it cooled.
- From the opposite figure, the ... layer is considered the oldest layer.
 a. (1) b. (2)
 c. (3) d. (4)



2. Study the opposite diagram, then answer the following questions :

- What do the numbers (1) and (2) indicate ?
- How can you differentiate between the rock No. (1) and the sandstone ?
- What is the difference between the rock No. (1) and marble ?

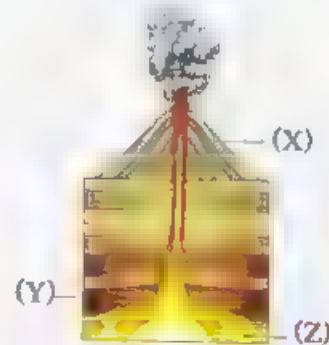


3. The opposite figure shows the way of formation of two types of rocks, which are :

- Rock (X) is crystallized quickly when exposed to atmospheric air.
- Rock (Y) is exposed to pressure and high temperature.

Answer the following questions :

- Mention the type of each rock (X) and (Y).
 Give an example of each of them.
- What happens when the substance (Z) solidifies ?



Glossary



Unit 1

Lesson 1

Chemical combination	اتحاد كيميائي
Metals	فلزات
Nonmetals	لافلزات
Noble gases	غازات نبيلة (حاملة)
Luster	بريق
Malleable	قابل للطرق
Ductile	قابل للمسحب
Positive ion	أيون موجب
Negative ion	أيون سالب
Sharing (Participate)	يشارك
Monoatomic	أحادي الذرة
Ionic bond	رابطة أيونية
Attraction	تجاذب
Table salt	ملح طعام
Covalent bond	رابطة تساهمية

Lesson 2

Chemical compounds	مركبات كيميائية
Valency	تكافؤ
Atomic group (Radical)	مجموعة ذرية
Solely (Individually)	مفردة
Monovalent	أحادي التكافؤ
Divalent	ثنائي التكافؤ
Trivalent	ثلاثي التكافؤ
Tetravalent	رباعي التكافؤ
Pentavalent	خماسي التكافؤ
Hexavalent	سداسي التكافؤ
Chemical formula	صيغة كيميائية
Acids	أحماض
Bases	قلويات
Oxides	أكاسيد
Salts	أملاح
Bendable	قابل للانحناء

Dissociate	تتفكك
Mineral acids	أحماض معدنية
Sour	لادع
Litmus paper	ورقة عباد شمس
Bitter	مر
Metal oxides	أكاسيد فلزية
Nonmetal oxides	أكاسيد لافلززية

Lesson 3

Chemical equation	معادلة كيميائية
Chemical reaction	تفاعل كيميائي
Fertilizers	أسمدة
Magnesium ribbon	شريط مغنيسيوم
Reactants	متفاعلات
Products	نواتج
Set of symbols	مجموعة رموز
Law of conservation of matter	قانون بقاء المادة
Law of constant ratios	قانون النسب الثابتة
Direct combination reactions	تفاعلات الاتحاد المباشر
Ammonia solution	محلول نشادر
White clouds	سحب بيضاء
Concentrated (Conc.)	مركز
Environmental pollution	تلوث بيئي
Greenhouse	صوبة زجاجية
Permit	يسمح
Penetration	اختراق
Headache	صداع
Faint	تعب (ارهاق)
Stomach-aches	ألم بالمعدة
Malfunction	خلل وظيفي
Corrosion	تآكل
Lightning	برق
Poisonous	سام
Cellulose fibres	ألياف سليولوزية
Cancer	سرطان

Lesson 1

Force	قوة
Fundamental forces in nature	القوى الأساسية في الطبيعة
Improper	غير مناسب
Proper	مناسب
Static	ساكن
Attempt	بحاول/محاولة
Lightning	برق
Thunder	الرعد
Wind motion	حركة الرياح
Fire weapons	الأسلحة النارية
Nuclear explosions	الانفجارات النووية
Atomic reactors	المفاعلات الذرية
Gravitational forces	قوى جاذبية
Electromagnetic forces	قوى كهرومغناطيسية
Nuclear forces	قوى نووية
Weak nuclear forces	قوى نووية ضعيفة
Strong nuclear forces	قوى نووية قوية
Earth's gravitational force	قوة جذب الأرض
Mass	كتلة
Object's weight	وزن الجسم
Earth's gravitational acceleration	عجلة الجاذبية الأرضية
Approach	تقرب
Magnetic force	قوة مغناطيسية
Electric current	تيار كهربى
Flow of electric charges	سريان الشحنات الكهربائية
Electromagnet	مغناطيس كهربى
Isolated copper wire	سلك نحاسى معزول
Wrought iron	حديد مطاوع
Iron filings	برادة حديد
Applications	تطبيقات
Scrap iron	حديد خردة
Ports	موانئ
Electric generator	مولد كهربى

Massive amount	كمية ضخمة
Military purposes	أغراض عسكرية
Accompanied	مصاحبة
Radioactive elements	عناصر مشعة
Scientific researches	أبحاث علمية

Lesson 2

Accompanied forces	قوى مصاحبة
Force of inertia	قوة القصور الذاتي
Friction force	قوة الاحتكاك
Rushed forward	اندفاع إلى الأمام
Resist	يقاوم
Safety belts	أحزمة الأمان
Resistance	مقاومة
Brakes	فراامل
Slipping	الانزلاق
Performance	كفاءة
Lubricating	تشحيم
Oiling	تزييت
Erosion	ناكل
Coarse	خشش
Uni-cellular	وحد الخلية
Multi-cellular	عديد خلايا
Concentration	تركيز

Lesson 3

Wave motion	الحركة الموجية
Relative motion	الحركة النسبية
Opposite direction	اتجاه عكسى
Frame of reference	نقطة مرجعية
Transitional motion	حركة انتقالية
Periodic motion	حركة دورية
Regularly repeated	تتكرر بانتظام
Vibrating motion	حركة اهتزازية
Circular motion	حركة دائرية
Mechanical waves	أمواج ميكانيكية

Electromagnetic waves	أمواج كهرومغناطيسية	Comets	لمذنبات
Relatively low	قليلة نسبيًا	Opaque bodies	أجسام معتمة
Extremely high	كبيرة جدًا	Inner planets	كواكب داخلية
Solar explosions	انفجارات على سطح الشمس	Outer planets	كوكب خارجي
Curing sets	أجهزة علاجية	Grant planets	كواكب عملاقة
Stringed musical instruments	أجهزة موسيقية وترية	Extreme coldness	البرودة القاسية
Pneumatic musical instruments	أجهزة موسيقية هوائية	Density	كثافة
Night vision apparatus	جهاز الرؤية الليلية	Follower	تابع
Sterilize	بعدم	Rocky masses	كتل صخرية
Surgical operations rooms	حجرات العمليات الجراحية	The belt of the wanderer asteroids	حزام الكويكبات السائرة
Bone fractures	كسور عظمية	Luminous arrows	سهام ضوئية
Tumors	أورام	Elongated elliptical orbits	مدارات بيضاوية شديدة الاستطالة

Unit 5

Lesson 1

Celestial bodies	أجسام فضائية
Space	فضاء
Stars	نجوم
Clear moonless nights	ليالي مفعرة صافية
Huge number	عدد هائل
Bright bodies	أجسام لامعة
Emit	تشع
Enormous amounts	كميات هائلة
Astronomers	الفلكيون
Light year	السنة الضوئية
Galaxy	مجرة
Solar system	النظام الشمسي
The Way of Chopped Hay galaxy	مجرة درب التبانة
Milky Way galaxy	مجرة الطريق اللبنى
Coiled spiral arms	أذرع حلزونية ملتفة
Planets	كواكب
Moons	أقمار
Asteroids	الكويكبات
Meteors	الشهب
Meteorites	النيازك
Tremendous	هائل

Solidified gases	غازات متجمدة
Gaseous cloud	سحابة غازية
Discovering	اكتشاف
Identifying	التعرف على
Reflecting telescope	التلسكوب العاكس
Refracting telescope	التلسكوب الكسر

Lesson 2

Description	وصف
Earth's rotation	دوران الأرض
Earth's location	موقع لأرض
Slight flattening	تفلطح بسيط
Two poles	القطبين
Indented	منبمع
Equator	خط الاستواء
Tropical radius	نصف القطر الاستوائي
Polar radius	نصف القطر القطبي
Atmosphere	الغلاف الجوى
Hydrosphere	الغلاف المائى
Air pressure	الضغط الجوى
Captured	ملتقطعة
Combustion	احتراق

Weather	الطقس	Crystals	بلورات
Climate	المناخ	Granite	جرايت
Salty water	ماء مالح	Basalt	بازلت
Fresh water	ماء عذب	Heavy	ثقل
Constancy	ثبات	Rough	خش
Steadfastness	استقرار	Cohesion	ماسك
Earth's crust	القشرة الأرضية	Cohesive	متعاسك
The mantle	الوشاح	Feldspar	الفيلسبار
The core	اللب	Pyroxene	البيروكسين
Lesson 10		Mica	ميك
Components	مكونات	Olivine	لاوليفين
Superficial layer	طبقة سطحية	Mixture	خليط
Fragmented	مفتتة	Wrap	غلاف
Loosened	مفككة	Erosion	تعرية
Minerals	معادن	Disintegration	تفتت (تحلل)
Decayed organic materials	مواد عضوية متحللة	Transportation	نقل
Soil	تربة	Deposition (sedimentation)	ترسيب
Solid basis	أساس الصلب	Sand	رمل
Rock	صخر	Shingle	حصى
Igneous rocks	صخور نارية	Gravel	رمل
Sedimentary rocks	صخور رسوبية	Sandstone	الحجر الرملي
Metamorphic rocks	صخور متحولة	Limestone	الحجر الجيري
Magma	الماجما (الصهارة)	Lime solutions	محاليل خيرية
Molten material	مادة منصهرة	Marble	رخام
Lava	للافا	Impurities	شوائب
Solidification	لتحد	Solidity	صلابة
Underneath	اسفل	Crater of volcano	فوهة البركان
Volcanic flows	حمم بركانية		
Plutonic rock	صخر جوفي		
Volcanic rock	صخر بركاني		
Huge masses	كتل ضخمة		
Coarse texture	ملمس خش		
Volcanoes	بركاني		
Smooth texture	ملمس ناعم		
Small circular holes	فجوات دائرية صغيرة		

SCIENCE

NOTEBOOK

By A Group Of Supervisors



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Unit

1

Worksheets

UNIT **1** | Chemical Reactions

UNIT **2** | Force and Motion

UNIT **3** | Earth and Universe.



Chemical Combination



1. Complete the following :

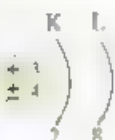
- _____ is the only liquid nonmetal element, while _____ is the only liquid metal element. (Part Said 2019)
- During the chemical reaction, magnesium atom (${}^{24}_{12}\text{Mg}$) _____ two electrons and changes into _____
- The outermost energy level of chlorine atom (${}^{35}_{17}\text{Cl}$) contains _____ electrons, while that of chloride ion contains _____ electrons.
- Nonmetals are _____ conductors of electricity except .. _____ .. which is a good conductor of electricity.
- Elements can be classified according to their properties and electronic structure into _____ and _____

2. Choose the correct answer :

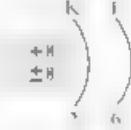
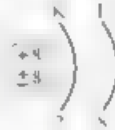
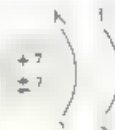
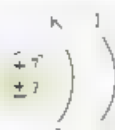
1. All of the following elements change into negative ions during chemical reactions, except



2. Which of the following figures represents the structure of aluminium ion ? (Fig.)



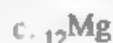
3. Which of the following figures represents the structure of nitrogen ion ? (Fig.)



4. During chemical reactions, oxygen atom (${}^{16}_8\text{O}$) gains electrons and changes into _____



5. The following elements are good conductors of electricity, except



3. A. Answer the questions to each of the following:

1. The atom which gained an electron or more during the chemical reaction.

(El Qahmury Formal Sch., Aswan 2022) ()

2. The atom which lost an electron or more during the chemical reaction.

(Fayoum 2019) ()

3. Elements don't participate in chemical reactions due to the completeness of their outermost energy level.

(Hofr El baten Sch. / Giza 2019) ()

B. Put (✓) or (x), then correct what is wrong :

1. The number of energy levels in positive ion is more than that of its atom. ()

2. During the chemical reaction, sodium atom loses two electrons and changes into positive ion. ()

3. The outermost energy levels of metals contain 5 , 6 or 7 electrons. ()

4. A. Give reasons for :

1. When an atom gains an electron or more during the chemical reaction, it becomes a negative ion.

(Elent huf 2019)

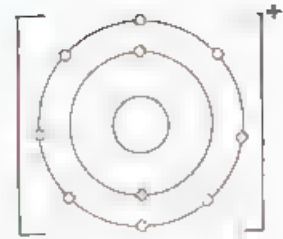
2. Both aluminium ion and nitrogen ion have the same number of electrons.
[knowing that : $^{27}_{13}\text{Al}$ & $^{14}_7\text{N}$].

3. Both sulphur ion and calcium ion have the same number of energy levels.
[knowing that : $^{32}_{16}\text{S}$ & $^{40}_{20}\text{Ca}$].

B. Mention the characteristics (properties) of metals.



1. The opposite figure shows the electron configuration of ion of an element.



1. Mention the type of the element and its atomic number.

2. What is the number of protons in this ion ?

3. What is the type of the bond formed from the combination of this ion with negative chloride ion ?

2. A. What is meant by ... ?

(Port Said 2019)

1. Ionic bond :

2. Covalent bond :

B. Give reasons for :

1. The bond in a hydrogen molecule is a single covalent bond.

2. The chlorine atom ($_{17}\text{Cl}$) tends to combine with potassium atom ($_{19}\text{K}$) by an ionic bond

3. Complete the following :

1. During the formation of NaCl molecule, .. atom loses an electron which is gained by atom.

2. The bond in sodium chloride molecule is .. bond, while the bond in nitrogen molecule is .. bond.

(Red El Farag Zone / Cairo 2022)

3. The ion of metallic element is .. charge, while the ion of nonmetallic element is .. charge.

Chemical Compounds

Workbook

1. Complete the following :

1. The valency of ferric is .. , while that of ferrous is ..
2. The chemical formula of sodium hydroxide is .. , while that of sulphuric acid is ..
3. During chemical reactions, oxygen atom can .. or .. two electrons.
4. The chemical formula of bicarbonate group is .. and its valency is ..
5. The table salt molecule is formed of combination of .. positive ion and .. negative ion.

2. A. What is meant by ... ?

(Science Inspectorate - Qena 2022)

1. Valency :

2. The chemical formula of silver chloride is AgCl

(El Gharak Zone - Alex 2019)

B. Write the chemical formula of each of the following :

1. Aluminium carbonate :

(Cairo 2019)

2. Sodium sulphate : ..

(New Cairo Zone - Cairo 2019)

3. Magnesium hydroxide :

(El Dakki Zone - Giza 2019)

4. Ammonium carbonate :

(Patriarchal College - Cairo 2019)

5. Calcium phosphate :

(El Dakki Zone - Giza 2019)

3. A. Choose the correct answer :

1. All of the following are monovalent atomic groups, except

- a. nitrate. b. bicarbonate. c. phosphate. d. nitrite.

2. The chemical formula of calcium carbonate is

- a. Ca_2CO_3 b. CaCO_3 c. CaCO_2 d. CaSO_4

B. Write the scientific term for each of the following :

1. A set of atoms of different elements joined together and behave like one atom during the chemical reaction.

(Ismail El Habrouk Sch - Behira 2019) ()



2. A formula that represents the number and the type of the atoms in a molecule

(.....)

4. *Write the scientific term for each of the following :*

1. Water molecule consists of two atoms of three different elements.

.....

2. The valency of carbon in (CO_2) molecule is divalent.

.....

3. The valency of noble gases is monovalent.

.....

B Give reasons for :

1. Sodium is monovalent, while calcium is divalent.

.....

2. Aluminium oxide molecule is composed of two aluminium atoms and three oxygen atoms.

.....



1. A. Write the scientific term for each of the following :

1. Compounds dissociated in water producing negative hydroxide ions

(H. Agains Zone Alex 2019) (....)

2. Compounds produced as a result of the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).

(Saint Mary Sch. / Cairo 2019) (....)

B Give reasons for :

1. Acids turn the colour of litmus paper into red.

.....

2. Limewater is from bases, while lead sulphate is from salts.

.....

2. A Complete the following :

1. Bases change the colour of litmus paper into .. due to the presence of .. ions.

2. Calcium nitrate is an example of water .. salts, while lead iodide is an example of water salts.

- B How can you distinguish between two unmarked tubes, one contains an acid and the other contains a base ?

.....

.....

.....

3. Choose the correct answer :

1. When an element (${}_1X$) combines with oxygen, the symbol of the produced oxide is _____

a. XO

b. X_2O

c. XO_2

d. X_2O_3

2. All of the following are water soluble salts, except _____

(Shebin El Khayma Directorate - Matruh 2019)

a. sodium chloride.

b. sodium sulphide.

c. silver chloride.

d. potassium sulphate.

3. Sulphuric acid is characterized by all of the following, except _____

a. its chemical formula is (H_2SO_4) .

b. it is a mineral acid.

c. it changes the colour of litmus into red.

d. it has a bitter taste.

4. A. Give an example for each of the following :

1. Nonmetal oxide : _____

(Science Inspectorate - Giza 2022)

2. Water insoluble salt : _____

(El-Agamy Zone - Alex. 2019)

3. Mineral acid : _____

4. Metal oxide :

- B Compare between sodium hydroxide and sulphuric acid

Sodium hydroxide	Sulphuric acid
.....
.....
.....
.....
.....
.....



on Lessons 1 & 2 Unit One

1. Complete the following :

1. The ion of iron II is called , while the ion of iron III is called
2. The ion of metallic element is charge while the ion of nonmetallic element is charge.
3. The valency of metallic atoms indicates the number of electrons that are during the chemical reaction, while the valency of nonmetallic atoms indicates the number of electrons that are or
4. In ion, the number of protons in the nucleus is less than the number of that rotate around it.

2. Give reasons for :

1. Argon element can't form positive ion or negative ion in ordinary conditions
2. We can differentiate between acids and bases by using litmus paper

3. A. Identify the type of the following compounds :

1. SO_3

2. PbSO_4 :

3. Ca(OH)_2 :

4. HNO_3 :

(Brilliance Sch - Alex - 2019)

B. Choose the correct answer :

1. From properties of graphite element that

a. it is a malleable and ductile.

b. it has a metallic luster.

c. it is a good conductor of electricity

d. it is a good conductor of heat

2. The changing of lithium atom (Li) into lithium ion (Li^+) means that it

a. gains proton.

b. gains electron.

c. loses proton.

d. loses electron

3. From properties of acids that ..

- a they change the colour of red litmus paper into blue.
- b they have a bitter taste.
- c. they give H^+ ions on dissociation in water.
- d their aqueous solutions feel slippery.

4. A Write the chemical formula of the following compounds

1. Sodium oxide :

(Orman Smart Sch – Cairo 2019)

2. Copper sulphate : ..

....(Patriarchal College Sch – Cairo 2019)

3. Sodium carbonate :

Science Inspectorate – Giza 2022

4. Hydrochloric acid :

B. Define :

1. The ion :

.....

El Dokki Zone – Giza 2019

2. Atomic group :

.....

Chemical Equations & Reactions

QUESTIONS

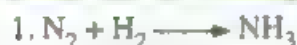
1. A. In the following reaction :

(New Cairo Zone / Cairo 2019)



- The bond in oxygen molecule is broken to give atoms.
- Magnesium atom combines with atom to form molecule.
- Given that the mass of (Mg) = 24 and that of (O) = 16
Calculate the total mass of the products.

B. Write and balance the following chemical equations :



2. Give reasons for :

1. On burning a magnesium ribbon in air, a white powder is formed.

2. The chemical equation should be balanced.

(New Inspectorate / Giza 2022)

3. What is meant by

1. Chemical reaction :

(El-Dokki 2019)

2. Law of constant ratios :

4. Explain the following statement :

The mass of water is always 9 parts by mass with 1 part by mass of hydrogen.

[knowing that the atomic mass of H = 1 and O = 16]



Worksheet

1. What happens in each of the following :

[Explain your answer with balanced chemical equation]

- Putting a glass rod wet with conc. hydrochloric acid close to the opening of a test tube containing ammonia solution. (Samounoud Zone / Gharbia 2019)

- Burning a piece of coal in air.

2. A. Write the scientific term :

- Reactions which involve combination between a compound with another or an element with another. (Shoubra El Khima Zone / Al Qalyoubia 2022) ()
- Oxides that cause building corrosion. (El Salami Evangelical Sch. / Ismailia 2019) ()
- The gas which causes a greenhouse effect. (Bedfamer Sch. / Alex 2019) ()

B. Write the scientific term for greenhouse phenomenon

3. Give reasons for :

- Lightning causes environmental pollution.
- Risk of nitrogen oxides on human health.

4. Complete the table comparing the properties of sulphur oxides. Concerning [Examples The negative effect] :

Points of comparison	Carbon oxides	Sulphur oxides
1. Examples :		
2. The negative effect :		

General Exercise ?

of the School Book

Chapter 10

1. Write the scientific term :

- The number of electrons gained or lost via an atom during a chemical reaction (.....)
- A bond resulted from the electrical attraction between a metal atom (positive ion) and nonmetal atom (negative ion). (.....)
- Substances dissociate in water producing positive hydrogen ions (H^+). (.....)
- Breaking the reactants bonds and forming new ones among the products (.....)
- A set of joined atoms behaving like a single atom during the chemical reaction (.....)
- A set of chemical formulae and symbols expressing the reactants, the products and the reaction conditions. (.....)
- Substances are dissociated in water producing negative hydroxide ions (OH^-) (.....)

2. A knowledge that the chemical formula for xy_2 is (.....) however it is not in the way that the two atoms of xy_2 can be combined then show the type of the produced bond

B. Compare between each pair :

- An atom and an ion.

An atom	An ion
.....
.....
.....
.....

2. Ionic bond and covalent bond.

Ionic bond**Covalent bond**

3. Metals and nonmetals.

Metals**Nonmetals**

4. An acid and an alkali.

An acid**An alkali**

3. A. Indicate using symbols and word equations at least five of the types of direct combination reaction between :

1. Element with an element :

2. Element with a compound :

3. Compound with another compound :

B. Write the chemical formula for the following :

1. Calcium nitrate :

2. Copper sulphate :

3. Sodium carbonate :

4. Aluminum oxide :

- C. One of your classmates has asked you to share him writing a report on the role of technology in chemical reactions, indicating the importance and highlighting its bad effects on the environment. What is the information you will support him with ?

Answer the following questions :

Question 1 14 marks

A Put (✓) or (✗) , then correct the wrong one :

1. The mass of a molecule of chlorine equals 71 gm. [$\text{Cl} = 35.5$]. ()
2. The chemical formula of nitrate group is (NO_2) , while that of nitrite group is (NO_3) . ()
3. Calcium sulphate molecule is formed of 3 atoms for six different elements. ()
4. The ion of beryllium element (${}_4\text{Be}$) carries one positive charge. ()

B Write the name of the following compounds :

1. NaNO_3 :
2. $\text{Ca}(\text{OH})_2$:
3. H_2SO_4 :
4. Na_2O :

(Al Resala Sch. / Qatroum 2019)

C What is meant by ... ?

Negative ion :

Question 2 14 marks

A Correct the underlined words :

1. Sulphur oxides are poisonous acidic gases that affect the nervous system and the eye
(Moudi Zine / Cairo 2022) (.....)
2. Salts are substances that dissociate in water producing negative hydroxide ions (OH)
(Faxoum 2019) (.....)

3. Nonmetals are bad conductors of electricity except **sulphur**.

(El Salam Evangelical Sch / Ismailia 2019) (.....)

4. On burning magnesium strip in the presence of oxygen gas, **blue** powder is formed.

(Belkas Zone / Dakkhi 2019) (.....)



Then indicate .

1. The type of each element (Metal – Nonmetal – Noble gas).
2. The type of ion for each of them (Positive – Negative – No ions).
3. The valency of each of them.

(El Dakki Zone / Giza 2019)



Give a reason for :

Chemical equation should be balanced.

(Bent Siref 2019)

Question 3 14 marks



Complete the following .

1. To form 2 molecules of water, molecule(s) of hydrogen reacts with molecule(s) of oxygen.
2. Burning of coal and cellulose fibers cause pollution and
3. The chemical formula of aluminium hydroxide is and that of calcium carbonate is while that of sulphuric acid is
4. The bond in (NaCl) molecule is while the bond in (H₂O) molecule is

(Bent Siref / Giza 2019)



How can you differentiate between ... ?

1. H₂SO₄ and Ca(OH)₂

2. NaCl and AgCl

C What happens when ... ?

An atom loses one electron or more.

(Al Resala Sch - Qatrania 2019)

Question 4 14 marks

A Choose the correct answer :

- The bond in oxygen molecule is a/an bond.
a ionic b. single covalent c. double covalent d triple covalent
- The chemical reactions are used in
a medicine industry. b fertilizers industry.
c food industry. d all of the previous answers.
- The mass of 2 molecules of sodium hydroxide equals gm.
[knowing that the atomic mass of sodium (23), hydrogen (1) and oxygen (16)].
a 80 b 40 c 20 d 10
- The chemical formula of nitric acid is
a. H_2O b. HCl c. H_2SO_4 d HNO_3

B Show by chemical equation only :

(El Agamy Zone - Alex 2019)

- Burning of coal in air.
- Reaction between carbon monoxide and oxygen.

C Write the balanced chemical equation for the following reaction.



(Knowing that the mass of Mg = 24 & O = 16).

(Hafz El bahen Sch - Giza 2019)

Answer the following questions :

Question 1 14 marks

1. Breaking of the reactants bonds and forming new ones among the products.

(East Naser City / Cairo 2019) (.....)

2. A bond resulted from sharing of each atom with three electrons.

(Belkas Zone / Dakahlia 2019) (.....)

3. The number of electrons gained, lost or even shared by an atom during chemical reaction.

(Omrama Zone / Giza 2019) (.....)

4. A set of atoms joined together, behave like one atom only, having a special valency and can't exist solely.

(New Cairo Zone / Cairo 2019) (.....)

1. Ferric hydroxide :

2. Aluminium sulphate :

3. Calcium nitrate :

4. Sodium carbonate :

Give a reason for :

(Ashmoun Educational Zone / Menofia 2022)

Acids change the colour of litmus into red, while bases change the colour of litmus into blue.

Question 2 14 marks

1. Oxygen - Nitrogen Chlorine - Sodium

2. $\text{NaCl} - \text{MgCl}_2 - \text{HCl} - \text{Na}_2\text{SO}_4$

(El-Gomruk Zone / Alex. 2019)

3. $\text{H}_2\text{O} - \text{HBr} - \text{HCl} - \text{HNO}_3$

(Abo-Salem Sch. / Sharkia 2019)

4. Headache - Fainting Respiratory system malfunction Severe stomach aches.

(Ismail El-Habrouk Sch. / Behira 2019)

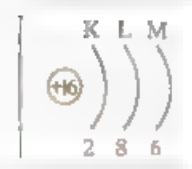
B Identify the type of the following compounds

1. KOH : 2. MgO :
3. H_2SO_4 : 4. NaCl :

C The opposite figure shows the structure of the element

Sulphur, mention :

1. The type of element
2. From the valencies for this element, .. and



Question 3 14 marks

A Complete the following :

- and are examples of metal oxides, while and are examples of nonmetal oxides.
- Increasing the ratio of gas in air leads to increasing the air temperature.
- Elements of are malleable and ductile, while elements of are not malleable or ductile.
- oxides affect the nervous system, while oxides cause respiratory system malfunction.

(Abo-Salem Sch. / Sharkia 2019)

B Copy the following figures in your notebook and after that copy them to the system



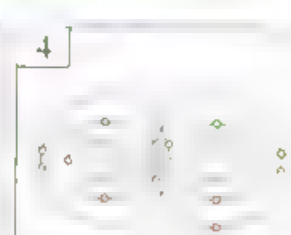
Fluorine molecule F_2



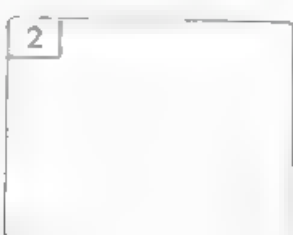
Water molecule H_2O



Oxygen molecule O_2



Nitrogen molecule N_2



Compare between :

An atom and an ion.

(East Nasser City - Cairo 2019)

Question 4 14 marks

Give an example of each of the following :

1. Noble gas.
2. Monovalent atomic group.
3. Metal has more than one valency.
4. Salt dissolves in water.

(Omrania Zone - Giza 2019)

(Omrania Zone - Giza 2019)

(Brilliance Sch - Alex 2019)

(Brilliance Sch - Alex 2019)

(A) Type of reaction	(B) Symbolic equation
1. Combination of a metal with a nonmetal	a. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc}} \text{NH}_4\text{Cl}$
2. Combination of an element with a compound.	b. $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$
3. Combination of a compound with another compound.	c. $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$
4. Combination of a nonmetal with a nonmetal.	d. $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} 2\text{CO}_2$

Worked Example 1

1. A car is moving :

1. Force : _____

2. Object's weight : _____

(Namiatoud Zone - Gharbia 2019)

B. Complete the following statements :

- When a racket hits the tennis ball, a _____ acting on the ball causing the change of its _____.
- _____, electromagnetic forces, and _____ are the main three divisions of forces in the nature.

2. A. Choose the correct answer :

- All of the following are examples for some fundamental phenomena, except
 - thunder.
 - wind motion.
 - water motion.
 - lightning.
- _____ is the measuring unit of the force.
 - Newton
 - Metre
 - Kilogram
 - Coulomb
- All of the following are from the effects of the force, except
 - moving a static object.
 - changing the direction of a moving object.
 - changing object's mass.
 - increasing the speed of a moving object.

B. Give reasons for :

- Object weight changes from one place to another on the Earth's surface.

(Sohag Zone - Sohag 2019)

- When you push a wall, it doesn't move.

3. A 1 kg object is falling from a height of 10 m. Its acceleration due to gravity is 10 m/sec^2 .

(Giza 2022)

2. Calculate the mass of a child if its weight is 342 newton, knowing that the acceleration due to gravity is 9.8 m/sec^2 . (Cairo 2022)

B. Put (✓) or (x):

- Object's weight is a fixed value, while the object's mass changes from a place to another on the Earth's surface. ()
- The exerted work to lift an object increases by increasing the object's mass. ()
(Shebin El Khayma Directorate / Menoufia 2019)
- The mass of a person at the equator is less than that its mass at the two poles. ()

4. What happens in the following cases ... ?

1. When the object's mass increases (concerning the object's weight)

2. When you kick a static ball with your foot.



1. Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Electric motor	a. changes the mechanical energy into electric energy.
2. Electromagnet	b. changes the electric energy into mechanical energy.
3. Electric generator	c. changes the electric energy into magnetic energy.
1. ...	2. 3.

2. A. Complete the following:

- Egypt seeks to use energy in producing electricity.
- The nuclear forces can be divided into and
- An atom stores a massive amount of energy inside its
- The fan and electric mixer are from devices that change energy into energy.

B. What is the importance of ... ?**1. Strong nuclear forces :**

(East Naser City Directorate / Cairo 2019)

2. Weak nuclear forces :

(Basateen & Dar Al Salam Adm / Cairo 2019)

3. What are the forces responsible for each of the following

1. Falling of objects towards the Earth's surface. ()
2. Changing the mechanical energy into electric energy. ()
3. Producing electricity from nuclear energy. ()
4. The emission of some invisible radiations from radioactive elements. ()

Chapter 10

1. A. Complete the following :

(Hafr El Baten Sch. / Giza 2019)

1. _____ and _____ are from the accompanied forces to motion.
2. Passengers are _____, once the vehicle moves forward suddenly after it was at rest due to _____ force.

B Choose the correct answer :

1. When the horse is tripped, the horse rider is suddenly rushed forward, this is related to the _____ force.
 - a inertia
 - b nuclear
 - c gravitational
 - d horse pushing
2. _____ is a technological application on inertia.
 - a Car tyres
 - b Safety belts
 - c Pulse inside blood vessels
 - d Cars' brakes

2

represents moving the bus suddenly ? (Give a reason) .



Fig. (1)



Fig. (2)

3. A. What is meant by inertia ?

(El Gomrok Zone / Alex. 2019)

- 1 The football player is rushed forward and falls down if he is tripped during running. ()
- 2 Force is a property of an object has to resist the change of its state. ()

4. Give reasons for :

1. The car passengers are rushed forward when the moving car stops suddenly.

(Curra 20

2. Policemen advise drivers to use safety belts in cars.

(F. Saad El - orgenical Sch - Ismatia 2019.)

3. The person falls on his face if he collides with a stone while running.

1. Put (✓) or (x) , then correct the wrong ones :**B. Put (✓) or (x) , then correct the wrong ones :**

1. Heart muscle contraction and relaxation helps the heart to pump blood all over the body organs. ()

2. Liquids transport through pores and the walls of cells from the higher concentration to the lower one. (Shebin El Kam Directorate / Menofia 2019) ()

3. Asphalt is more rough in curved roads to reduce friction forces. ()

2. Mention

1. Three benefits of friction.

(El Gamrok Zone - Alex - 2019)

2. Three of the biological operations related to the forces inside living systems

3. Give reasons for

1. Lubricating and oiling of mechanical machines.

2. Car tyres are covered with a very coarse substance.

(Curra 20



on Lessons 1 & 2 Unit Two

1. Correct the underlined words :

- 1 The idea of lubricating machines depends on reducing its speed. (.....)
2. Electromagnet is used in making the calculator. (.....)
3. The liquids transport through pores and the walls of cells from the lower concentration to higher one by the effect of inertia forces. (.....)
- 4 Egypt seeks to use mechanical energy in producing electricity. (.....)
- 5 Car brakes are from applications on Earth's gravitational forces. (.....)

2. Mention three harms of friction.

3. A. Write the scientific term :

- 1 The product of multiplying object's mass by Earth's gravitational acceleration.
(Patriarchal College / Cairo 2019) (.....)
2. Resistant forces originated between the object in motion and the medium touching it.
(New Cairo Zone - Cairo 2019) (.....)
- 3 An instrument used to change the mechanical energy into electric energy.
(Assuit 2022) (.....)

B. If the Earth's gravitational acceleration at the Earth's surface is 9.8 m/sec^2 and it decreases linearly to zero at 4200 km below the Earth's surface level. Calculate the weight of a person whose mass is 75 kg at this height.

4. A. Complete the following :

1. Policemen advise drivers to use in cars and planes, as they act on stopping the force of

2. Electromagnet changes energy into energy.

(Al-Resala Sch. - Qalyoubia 2019)

3. Liquids transport through the walls of the cells from the concentration to the concentration.

B. What happens when ... ?

1 Migration of a bird from the south pole to the equator (related to the mass and the weight of the bird).

(Al-Resala Sch. - Qalyoubia 2019)

.....
.....

2. A moving bus stops suddenly (concerning the driver and the passengers).

.....
.....

Check Your Learning

1. A. Give one example for :

(Omranya Zone - Giza 2019)

1. Circular motion :

2. Wave motion :

3. Vibrating motion :

B Choose the correct answer :

1. In the periodic motion, the

a pathway is straight.

b motion is regularly repeated.

c time is regularly repeated.

d speed is regularly changed

2. All of the following are periodic motions, except the

a movement of the Moon around the Earth.

b pendulum motion.

c train motion.

d sunflower motion.

2. Define each of the following

1. Periodic motion :

2. Relative motion :

3. Transitional motion :

3. Complete the following statements :

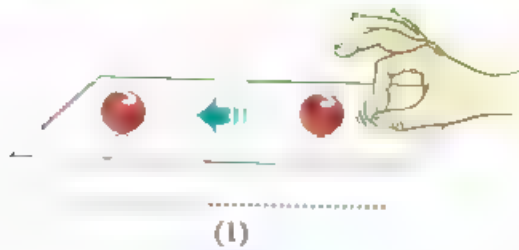
1. and are from the examples of transitional motion.

(Al-Rasaby Sch - Qalyubia 2019)

2. If you are in a stopping car and another car moves forward beside you, you will
imagine that your car moves

3. Types of motion are motion and motion. (Esc. in Mary Sch - Cairo 2019)

4. Mention the type of wave represented by each figure



Comparison

1. Compare between mechanical waves and electromagnetic waves (give suitable examples)

Mechanical waves

Electromagnetic waves

2. A. Complete the following statements :

1. and rays are emitted from the Sun.
2. The waves causing the wave motion are divided into two types which are and

B Put (✓) or (✗)

1. Flute and lute are examples of pneumatic musical instruments ()
2. Gamma rays, X-rays and ultraviolet rays are used in medical purposes. ()

3. Give reasons for :

1. We see lightning before hearing thunder.

(El-Mena 2022,

2. We receive the sunlight and we don't hear the sound of solar explosions.

U Resala Sch. Qalyubia 2019,

3. Astronauts can't hear each other voices directly in the space.

Ismail El-Habrouk Sch. Behira 2019,

4. A. Mention one application for the electromagnetic waves used in the following fields

1. Medical field :

2. Photography field :

3. Heat field :

4. Remote sensing field :

B. The opposite figure shows a fracture in the bones of one arm :

1. Mention the name of the waves used for this type of photography, then mention another technological application for these waves.



2. What is the difference between these waves and sound waves ?

General Exercise

of the School Book



on Unit Two

1. Choose the correct answer :

1. A force is an effect that ..
 - a. always changes the state of an object motion.
 - b. never changes the state of an object motion.
 - c. always changes an object position and direction.
 - d. may change the state of an object motion.
2. An object's weight on the Earth's surface is related to the force.
 - a. electromagnetic
 - b. gravitational
 - c. weak nuclear
 - d. strong nuclear
3. The amount of Earth's gravitational pull on the object is
 - a. object's mass.
 - b. object's weight.
 - c. gravitational acceleration.
 - d. centrifugal force.
4. Electromagnetic forces affect on the operation of the following, except for the
 - a. dynamo (electric generator).
 - b. electric motor.
 - c. car internal combustion engine.
 - d. electromagnet.
5. When the horse is tripped, the horse rider is suddenly pushed forward, this is related to the force of ..
 - a. inertia.
 - b. centrifugal.
 - c. gravitational.
 - d. the horse pushing.
6. The following forces and operations are an application on friction, except for
 - a. walking on the road.
 - b. car motion due to rotation of its wheel.
 - c. operation of dynamo (electric generator).
 - d. stopping the car using the brakes.
7. All of the following are periodic motions, except for
 - a. the fan motion.
 - b. the pendulum motion.
 - c. the projectiles motion.
 - d. the light waves.
8. All of the following are electromagnetic waves, except for the
 - a. thermal (infrared) rays.
 - b. visible light.
 - c. sound waves.
 - d. ultraviolet rays.



2. A. What is meant by ... ?

1. Relative motion.

2. Periodic motion.

3. An object's weight is 60 N.

4. Inertia.

B. Give reasons for :

1. Gravitational acceleration is changed on Earth's surface from a place to another.

2. An object's weight is changed from a place to another.

3. When a car stops suddenly, passengers are rushed forward.

C. Give the scientific term :

1. An object's position changes as time passes from its initial position to a different final one.

()

2. The amount of Earth's gravitational pull on an object.

()

Answer the following questions :

Question 1 14 marks

A Choose the correct answer :

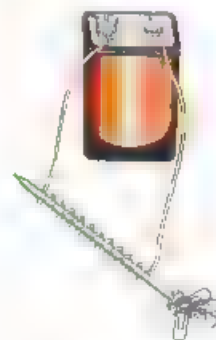
- The movement of sound and light waves is motion.
 - transitional
 - vibrating
 - circular
 - wave
- From harms of friction forces is
 - stopping the car when using the brakes.
 - landing slowly when using parachut.
 - rising of blood in veins against gravity.
 - increasing the temperature of gears of machines when operated for a long time.
- From forces enable living organisms to do biological operations
 - pulse.
 - friction.
 - inertia force.
 - all the previous.
- are used in examining bones.
 - Ultrasonic waves
 - Gamma rays
 - Infrared rays
 - X-rays

(Saint Mary Sch / Cairo 2019)

(Abo Salem Sch / Sharkia 2019)

B The opposite figure shows the idea of working of a device

- What is the name of this device ?
- What is the changes of energy in this device ?
- What happens when you disconnect one end of the wire from the battery ? What do you conclude ?



(Damietta 2019)

C Mention one benefit of friction.

Question 2 14 marks

A Complete the following :

- Friction is a resistant force originated between and
- When an object transfers from the equator to the north pole, is changed, while remains fixed.

3. The violin and the guitar are among _____ musical instruments, while flute and reed pipe are among _____ musical instruments.

4. Strong nuclear forces are used in producing _____ and in _____ purposes.

(Belkas Zone / Dakahla 2019)

B In the opposite figure :

What happens to the pen when pulling the paper quickly ?
(Give a reason)



C Calculate the mass of an object, its weight is 98 newton. Knowing that the Earth's gravitational acceleration = 9.8 m/sec^2

(Sohag Zone / Sohag 2019)

Question 3 14 marks

A Write the scientific term :

1 The effect that attempts to change the object's state from being static to motion or vice versa. (Fayoum 2019) (.....)

2 Waves produced due to the vibration of medium particles. (.....)

3. Motion which is regularly repeated in equal periods of time. (.....)

(El-Beheira 2022)

4 The ability of the Earth to attract an object to its centre (.....)

B Mention an application importance for each of the following

1. X-rays :

2. Friction force :

3. Infrared rays :

4. Weak nuclear force :



C Give a reason for :

Infrared rays are used in cooking food.

Question 4 14 marks

A Choose from column (B) what suits it in column (A)

(A)	(B)
Type of motion	Example
1. Vibrating motion	a. motion of sound waves.
2. Circular motion	b. motion of a train from station to another.
3. Wave motion	c. movement of the Moon around the Earth.
	d. motion of the simple pendulum.
1. .	2.
	3.

B Put (✓) or (x) :

1. Ultraviolet rays are used in examining mineral raws in industry ()
2. Dynamo changes the heat energy into electric energy. ()
3. Passengers are rushed forward when the moving car stops suddenly. ()
4. Earth's gravitational acceleration increases by approaching to the Earth's centre. ()

C Compare between light and sound waves (One point only for each)

(Al Resala Sch., Qalyoubia 2019)

Model Exam 2

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Answer the following questions :

Question 1 14 marks

A Correct the underlined words :

1. Strong nuclear forces are used in generating solar energy. ()

(El-Dokki Zone / Giza 2019)

2. Safety belts in cars work on increasing the forces of inertia. ()

(El-Dokki Zone / Giza 2019)

3. Friction causes a great loss of chemical energy. ()

(El-Gomrak Zone / Alex, 2019)

4. The motion of simple pendulum is an example of wave motion. ()

(El-Gomrak Zone / Alex, 2019)

B Mention one use of each of the following :

1. Electric winches : ..

2. Weak nuclear force :

3. Gamma rays : .

4. Visible light : ..

C What is meant by ?

Mechanical waves : ..

Question 2 14 marks

A Choose the correct answer :

1. If you know that the Earth's gravitational acceleration is 9.8 m/sec^2 , so the weight of an object its mass is 70 kg on Earth equals _____ newton

a. 5.88

b. 58.8

c. 686

d. 885

2. _____ is the scientist who discovered the Earth's gravity.

a. Planck

b. Newton

c. Archimeds

d. Coulomb

3. All of the following are periodic motions, except the _____

a. fan motion.

b. pendulum motion.

c. train motion.

d. sunflower motion

4. Electromagnet is used in making the _____

a. cooking food.

b. electric bell.

c. microscope.

d. data show.

D Look at the opposite figures then answer the following questions

(1) Friction in **B** is _____ (greater/less) than in **A**

(2) With lubrication (Fig **B**) you need _____ (more/less) force to move an object.

(3) Lubrication _____ (increases/decreases) friction.



C What happens when ... ?

(Onirama Zone - Giza 2014)

An electric current passes through an insulated copper wire coiling around a bar of iron.

Question 3 14 marks

A Put (✓) or (✗) , then correct the wrong one :

- 1 The mass of a person at the equator is less than its mass at the two poles. ()
- 2 Brakes are from examples of forces inside living systems. ()
3. Object's weight = its mass \times gravitational acceleration. ()
- 4 Electric generator converts heat energy into electric energy. ()

B What is the force responsible for each of the following , ?

1. Falling the coin inside the cup on pulling the paper placed on the top of a glass cup quickly
2. Ease of the movement on asphalt and difficulty on the gravel.
3. Pulse inside the blood vessels.
4. The rise of water and salts from the soil to the leaves of plant

C Give a reason for :

Sound needs a medium to travel through, while light travels through space

Question 4 14 marks**A** Write the scientific term of each of the following :

- 1 The force that accompanies the massive amount of energy and it stored in the nucleus.

(New Cairo Zone / Cairo 2019) (.....)

2. The property of object resistance to change its state from rest or movement unless force affect on it.

(Patriarchal College / Cairo 2019) (... ..)

- 3 It is an effect that attempts to change state of an object from static to motion or vice versa.

(Qena 2022) (... ..)

4. Changing an object's position as time passes from its initial position to final one.

(Hafz El-baten Sch. / Giza 2019) (... ..)

B Cross out the odd word, then mention the scientific name of the rest

- 1 Light waves – Sound waves – Microwaves – Radio waves

2. Gravitational force – Friction force – Nuclear force.

(Port Said 2022)

3. Light waves – Sound waves – Water waves.

(Assiut 2022)

4. Electric generator – Electric motor – Electric bell – Handbell

C Compare between (two points only) :

Transitional motion and periodic motion.

Transitional motion**Periodic motion**

Celestial Bodies

Worksheet 15

1. A. Complete the following statements :

1. The force of gravity between two objects in the space depends on _____ and _____

(Belkay Zone / Dekablin 2019)

2. The nearest planet to the Sun is _____ and the farthest one from the Sun is _____

(New Cairo Zone / Cairo 2019)

3. The galaxy that our solar system belongs to is called _____ or the Way of

B. What is meant by ... ?

1. Galaxies : _____

2. Celestial body : _____

(St. Joseph Maronite Sch / Cairo 2022)

2. Compare between the inner planets and the outer planets

(Modern Infinity Sch / Giza 2019)

Points of comparison	The inner planets	The outer planets
• Definition :	_____	_____
• Their arrangement from the Sun :	_____	_____
• Structure :	_____	_____
• Size :	_____	_____
• Density :	_____	_____
• No. of moons rotating around them :	_____	_____
• Atmosphere :	_____	_____

3. A. Give reasons for :

1. The density of outer planets is low.

2. Astronomers don't measure the distances between stars by kilometres

B. Choose the correct answer :

1. Planets revolve around the Sun in _____ paths. *(Basateen & Dar Al Salam Ahtim - Cairo 2019)*
 - a. circular
 - b. elliptical
 - c. spiral
 - d. irregular
2. In addition to the Sun, the solar system includes
 - a. eight planets only.
 - b. asteroids, meteorites and comets only.
 - c. stars and planets.
 - d. eight planets with the asteroids, meteorites and comets.
3. The planets rotate around the Sun by the effect of _____ gravity.
 - a. the Earth
 - b. the Sun
 - c. Jupiter
 - d. the Moon

4. A. Calculate the distance in light year between a star and the Sun, if the distance between them equals $75\,736 \times 10^{11}$ km.

8. Write the scientific term for each of the following :

1. The distance covered by light in one year. *(Fayoum 2019) (....)*
 2. The biggest body in the solar system. *(....)*
- C. What is the importance of telescopes ? Mention their kinds



1. Write the scientific term :

1. Luminous lines are formed in the sky due to the completely burning of small rocky masses in the Earth's atmosphere. *(Omrama Zone / Giza 2019) (....)*
2. The followers of the planets. *(El-Salam Evangelical Sch. / Ismailia 2019) (....)*
3. The region which separates between the group of inner planets from the group of outer planets. *(Al Qalyubia 2022) (....)*
4. The most famous comet which completes its revolution around the Sun each 76 years. *(Brilliance Sch. / Alex. 2019) (....)*

2. A. Put (✓) or (x), then correct what is wrong :

1. Comets revolve around the Sun in elongated elliptical orbits. *(....)*
2. Asteroids' belt is located between the orbits of Earth and Mars. *(....)*

(Shehm El-Kom Directorate - Menofia 2019)

3.

- _____ planets haven't moons revolving around them.
a. Uranus and Jupiter
b. Mercury and Venus
c. Earth and Mercury
d. Venus and Mars
- The mass of the biggest meteorite found up till now reaches _____ tons.
a. 100
b. 50
c. 80
d. 10
- _____ are rocky bodies of variable sizes and irregular shapes situated between Mars and Jupiter planets.
a. Moons
b. Galaxies
c. Comets
d. Asteroids
- The planet which has the greatest number of moons revolving around it, is
a. Neptune.
b. Jupiter.
c. Earth.
d. Saturn.

4.

1. The force of gravity on Jupiter planet is greater than any other planet.
2. The object's weight is changed from a planet to another

Worksheet 11

1. Complete the following :

1. The average radius of Earth is about _____, while its mass is _____.
2. The Earth's shape is completely circular accompanied with _____ at the two poles and _____ at the equator.
3. _____ layer protects living organisms from harmful rays.

(El Comrok Zone / Alex 2019)

4. Earth planet occupies the _____ order according to the distance from the Sun, where it is far from the Sun about km.
5. Green plants use _____ gas in photosynthesis process.

(East Nasser City Directorate / Cairo 2019)

2. A. What is the importance of ... ?

1. Nitrogen gas : _____

(Sohag Zone / Sohag 2019)

2. Oxygen gas : .. _____

(Sohag 2022)

B. Correct the underlined words :

1. The ratio of oxygen gas in air is about 78% of the air volume. (_____)
2. The Earth revolves a complete revolution around the Sun within 24 days. (_____)

3. Give reasons for :

1. The presence of a white colour surrounds the planet Earth
(Shehin El Kom Directorate / Menofia 2019)
2. Concerning the volume, the Earth occupies the medium position in the solar system.



4. Mention the characteristics of the planet Earth that support the continuity of life

(Abo-Salem Sch - Sharkia 2019)

Worksheet 18

1. Compare between :

1. Salty water and fresh water :

Salty water	Fresh water
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>
<hr/>	<hr/>

2. The inner core and the outer core :

(Damietta 2019)

Points of comparison	The inner core	The outer core
• Structure :	<hr/>	<hr/>
• Thickness :	<hr/>	<hr/>
	<hr/>	<hr/>
	<hr/>	<hr/>

2. What is the importance of water to plants and humans ?

3. Give reasons for :

1. Temperature on Earth's surface suits the life of living organisms.

2. The planet Earth is suitable for life.

3. Earth's inner core is rich in iron and nickel.

4. Steadfastness of the hydrosphere on the Earth's surface.

4. Choose the correct answer :

- The Earth is characterized by the presence of a suitable _____ of about 76 cm Hg
 a. gravity b. hydrosphere c. temperature d. air pressure
- The light outer layer of the Earth is called (Giza 2022,
 a. crust. b. mantle. c. outer core. d. inner core.
- The thickness of mantle layer is about km.
 a. 2270 b. 2858 c. 1216 d. 2885



on Lessons 1 & 2 Unit Three

1. Choose the correct answer :

- All of the following planets have an atmosphere, except
 a. Mercury. b. Venus. c. Earth. d. Mars.
- Most of the world map has a blue colour, because most of the Earth planet is
 a. snow, b. mountains. c. oceans. d. plains.
- The tail of the comet is considered
 a. a gaseous cloud. b. rocky parts.
 c. solidified gases. d. dust and water molecules.
- The figure that represents the area of fresh water compared with the area of salty water on Earth's surface is



2. What happens when ... ?

- The planet becomes nearer to the Sun.

- The air contains oxygen gas and is free of nitrogen gas.

(St. Joseph Maronite Sch. / Cairo 2022)



3. Friction of meteors with Earth's atmosphere.

4. Absence of ozone layer in the atmosphere.

(Donnetta 2019)

3. What do the following numbers indicate ?

1. (12 moons) : ,

2. (3.78 m/sec^2) : ..

3. (2100 km approximately) :

4. (8 – 60 km approximately) : ..

5. (6386 km approximately) : , (Sharkia 2022)

6. (29 %) :

4. Complete the following :

1. Inner planets are bodies, while outer planets are bodies

2. Water bodies represent about % of Earth's surface.

3. The followers of planets are called

4. The biggest planet in the solar system is while the smallest one is

Worksheet 20

1. A. Write the scientific term :

1. A thin non-compacted layer which covers the Earth's crust. (....)

2. A very hot thick liquid underneath the Earth's crust. (....)

(Maadi Zone / Cairo 2017)

3. A natural solid material exists in the Earth's crust and is formed of one mineral or a group of minerals. (Maadi Zone / Cairo 2022) (.... ..)

B. Complete the following table :

Points of comparison	Granite	Basalt
1. Colour :		
2. Minerals forming it :		
3. Found in :		

2. Complete the following :

1. Rocks are classified according to their way of formation into rocks, rocks and rocks. (El-Gomrok Zone / Alex. 2019)

2. Igneous rocks are divided according to the place of their formation into rocks and rocks.

3. The crystals of minerals that form the volcanic rocks are

4. When magma extruded to the Earth's surface in the form of, it is called

5. is an example of plutonic igneous rocks, while is an example of volcanic igneous rocks.

3. Give reasons for :

1. The plant roots extend easily through the upper part of the Earth's crust.

(Port Said 2019,

2. The crystals of minerals that form the plutonic rocks are large-sized

3. The crystals of minerals that form the surface rocks are small sized.

4. Volcanic rocks contain small circular holes.

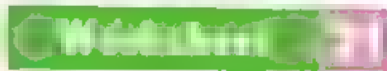
12. Rewrite the following statements after correcting them.

1. Sedimentary rocks are formed of molten material called magma.

2. Solid basis is formed of mineral substance, water, air, decayed organic materials and plant roots.

3. Volcanic rocks are formed inside the Earth's crust at great depths.

4. Basalt is heavy, rough, solid, cohesive and it isn't easily broken



1. What happens when ... ?

1. Adding dilute hydrochloric acid to limestone

2. Sedimentary rocks are subjected to pressure and high temperature

3. Precipitation of calcium carbonate in lime solution.

2. Complete the following :

1. and ... are examples of sedimentary rocks, while ... is an example of metamorphic rocks.

2. The formation of sedimentary rocks undergoes three stages which are ... , ... and ...



3. Limestone has a colour and texture, while sandstone has a colour and texture.
- 4 The sedimentary layers in the bottom are the , while the above ones are the more ..

3. A. Write the scientific term :

- 1 A kind of rocks which wraps about 75% of the surface of the Earth's solid mass.
(.....)
- 2 A rock produced by the conversion of limestone and it has a coarse texture.
(.....)
- 3 A rock formed of sand grains which are less than 2 mm in diameter.
(.....)

B. Put (✓) or (x), then correct the wrong ones :

1. Sandstone has more solidity than limestone. ()
- 2 The main mineral that forms limestone is quartz. ()

4. Complete the following diagram then mention an example for a metamorphic rock



General Exercise

of the School Book



my Mind Thinks

1. Give the scientific term for each of the following:

1. A molten material exists at depths beneath the crust. ()
2. A rock formed of lava flows when it comes on the Earth's surface. ()
3. The rocky masses that fall from the space and reach the Earth's surface. ()

2. Complete the following :

1. Planets revolve around the Sun in _____ orbits, which lie in _____ to the Sun's axis of rotation.
2. Granite consists of _____, _____ and _____ minerals, while basalt consists of _____, _____ and _____ minerals.

3. Give reasons for :

1. Some rocky masses that fall from space do not reach the Earth's surface

2. The plutonic igneous rocks are characterized by the presence of large-sized mineral crystals that can be seen by naked eye.

3. The Earth's inner core is rich in iron and nickel

4. Choose the correct answer :

1. Water bodies on Earth's surface form the percentage of
a. 50 % b. 71 % c. 40 % d. 30 %
2. The metamorphic rock is produced as a result of the effect of the heat and pressure on the rocks.
a. igneous only b. sedimentary only
c. metamorphic only d. igneous and sedimentary
3. The telescope is used to study the
a. minerals. b. earthquakes. c. celestial bodies. d. volcanoes.

5. Compare between each of the following :

1. The crust and the mantle.

The crust	The mantle

2. Sandstone rock and limestone rock

Sandstone rock	Limestone rock

3. The comets and the meteors.

The comets	The meteors

6. If you are a basketball player — make a trip in the space to the planet Mars, and play the basketball game, then let the ball enter the hoop towards the basket and put the ball inside than you play on Earth's surface ?

Explain your answer in the light of your previous study

Answer the following questions :

Question 1 14 marks

A Put (✓) or (x) :

1. The acceleration due to gravity on Saturn planet is less than that on Earth planet. ()
2. The Earth rotates around the Sun by the effect of inertia forces. ()
3. On the formation of sedimentary rocks, the size of transported grains decreases by increasing the speed of water current. ()
4. The polar radius is larger than the tropical radius. ()

B Write the scientific term of each of the following

1. The distance covered by light in one year. (Fayoum 2019) ()
2. Masses of rocks, ice and solidified gases rotate around the Sun in more elongated elliptical orbits. (Port Said 2019) (.....) ()
3. A rock that is produced from the conversion of limestone. () (El Sahel Evangelical Sch / Asmatia 2019)
4. Small space bodies that are affected by the planets' gravity. () (Shebin El Khayma Directorate / Menoufia 2019)

C Give a reason for :

Plutonic rocks have coarse texture, while volcanic rocks have smooth texture.

Question 2 14 marks

A Cross the odd word out then mention the scientific name of the rest

1. Mercury – Venus – Jupiter – Mars. (North Giza Zone / Giza 2022)
2. Earth – Venus – Neptune – Halley. (Abo Salem Sch / Shubra 2019)

3. The Sun – Mars – Earth – Jupiter.

4. Asteroids – Comets – Moons – Earthquakes.

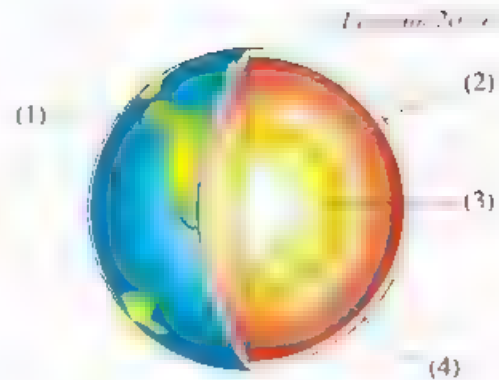


(1) ..

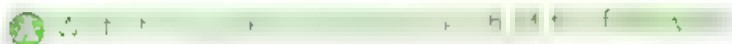
(2) -

(3) -

(4) ..



Question 4 marks



1. The distance between the Earth planet and the Sun. ()
2. The normal atmospheric pressure. ()
3. The density of outer planets. ()
4. Number of moons of inner planets group. ()

B Choose the correct answer :

- 1 The big sized, less dense planet which consists of gaseous elements is

a. Earth.	b. Mercury.	c. Jupiter.	d. Venus.
-----------	-------------	-------------	-----------
- 2 Water bodies on Earth's surface form about

a. 50 %	b. 71 %	c. 40 %	d. 29 %
---------	---------	---------	---------
3. Planets revolve around the Sun in paths. (Sohag Zone / Sohag 2019)

a. circular	b. elliptical	c. spiral	d. irregular
-------------	---------------	-----------	--------------



4. The Earth takes to rotate around the Sun.

(Beni Suef 2019)

- a. 24 hours b. 365.25 days c. 30 days d. 60 minutes

C What do you expect in the following case if ?

The Earth occupies the second order according to the distance from the Sun.

Question 4 14 marks

A Complete the following :

1. _____ is from sources of salty water, while _____ is from sources of fresh water.
2. Planets revolve around the Sun in _____ orbits which lie in a plane _____ to the Sun's axis of rotation.
3. _____ is a very hot thick fluid underneath Earth's crust and when it is extruded to the Earth's surface in the form of _____ it is called _____.
4. The atmospheric envelope appears as a _____ colour around the Earth, while the blue colour represents the _____.

B Choose from column (B) and (C) what are suitable for column (A)

(A)	(B)	(C)
1. Comet	a. A sedimentary rock	A To measure the universal distances.
2. Galaxy	b. A fracture in the outer core	B The main component is quartz mineral.
3. Sandstone	c. A unit that forms the universe	C Its origin is from limestone
4. Marble	d. A white pure metamorphic rock.	D Tremendous collection of stars
5. Basalt	e. A volcanic igneous rock	E. Is formed of olivine, pyroxene and feldspar minerals.
	f. It consists of yellow small granules from basic minerals	F. Is consisted of head and tail.
	g. It rotates around the Sun in orbits intersecting with the planets' orbits.	G. Its origin is from molten materials after hardening.

1. → 2. → 3. → 4. → 5. →

Model Exam

2

56

Answer the following questions :

Question 1 14 marks



(A)

1. Carbon dioxide gas
2. Nitrogen gas
3. Oxygen gas
4. Water vapour

(B)

- a. forms about 21% of the air volume.
- b. forms about 0.97% of the air volume.
- c. forms about 78% of the air volume.
- d. forms about 0.03% of the air volume.
- e. percentage is unstable.

1

2

3

4

B Correct the underlined words :

1. Green plants use nitrogen gas in photosynthesis process. ()
2. On adding dilute hydrochloric acid to sandstone, an effervescence of carbon dioxide gas evolves. ()
3. Comets are the greatest units that form the universe. ()
4. Plutonic rocks contain small circular holes. ()

C What is meant by ... ?

Sedimentary rocks

Question 2 14 marks



State the difference in the structure of the following rocks

1. Granite :
2. Basalt :

3. Limestone :

4. Sandstone :

B Write the scientific term :

1. It's a layer of molten metals with a thickness 2100 km.

(Saint Mary Sch. / Cairo 2019) (...)

2. The biggest inner planet.

(New Cairo Zone / Cairo 2019) (...)

3. The region which separates the group of the inner planet from the outer planet.

(Boutaten & Dar Al Salam Adm / Cairo 2019) (...)

4. The name of the galaxy that our solar system belongs to it.

(...)

(German Smart Sch / Cairo 2019)

C Compare between meteors and meteorites.

Meteors	Meteorites

Question 3 14 marks

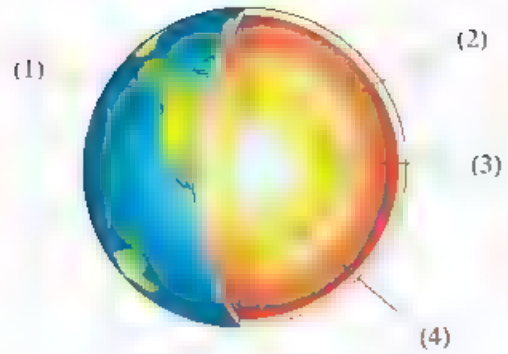
A Complete the following :

- Formation of sedimentary rocks takes place in three stages which are _____ , _____ and _____
- _____ gas enters in formation of proteins by plants and it represents about _____ % of the air volume.
- _____ layer protects living organisms from harmful _____ rays.
- _____ rocks originate from fragmentation of old rocks, while _____ rocks originate from exposing the igneous or sedimentary rocks to pressure and high temperature.

- B** The opposite figure represents the layers of the Earth.

Mention the number of the layer which :

1. Its thickness is about 2885 km : ..
2. Its upper part is fragmented :
3. Its radius is about 1350 km :



- C** Give a reason for :

Temperature on the Earth's surface suits the life of living organisms

Question 4 14 marks

- A** Put (✓) or (✗) then correct the wrong one

1. Earth's radius between the two poles is larger than that at the equator. ()

(Hafr El-baten Sch / Giza 2019)

2. The percentage of salty water in the Earth is 3%. ()

(Modern Infinity Sch, / Giza 2019)

3. The biggest acceleration is on Jupiter planet. ()

4. The normal atmospheric pressure is 70 cm. Hg. ()

(Sohag Zone / Sohag 2019)

- B** Which of the following rocks is sedimentary, igneous or metamorphic ?

1. Marble 2. Granite 3. Limestone 4. Basalt

- C** What are the main factors that lead to the formation of the metamorphic rocks ?

Monthly Tests

March-April

April Tests



March Tests

Test 1

Total mark

10

Question 1 5 marks

A Choose the correct answer :

- All of these elements can form negative ions, except ..
 oxygen (${}_8\text{O}$). nitrogen (${}_7\text{N}$). chlorine (${}_{17}\text{Cl}$). aluminium (${}_{13}\text{Al}$)
- All of these salts dissolve in water, except
 a. sodium chloride. b. potassium sulphate.
 c. silver chloride. d. sodium sulphide.
- If the mass of an object is 2 kg and the Earth's gravitational acceleration is 10 m/sec^2 , the object's weight equals
 a. 0.2 newton. b. 2 newton. c. 20 kg. d. 20 newton.
- Direct combination reaction takes place between
 a. two nonmetals. b. a metal and a nonmetal.
 c. a compound with another. d. all the previous answers.

B Give a reason for the following :

White clouds are formed when conc. hydrochloric acid reacts with ammonia gas.

Question 2 5 marks

A Put (✓) or (x) :

- Object's weight = Its mass \times Gravitational acceleration. ()
- The bond in water molecule is an ionic bond. ()
- The atomic group acts as a compound in the chemical reaction. ()
- On burning a magnesium strip in the air, a black powder is formed. ()

B What happens when ... and why ?

You push a wall with your hand.



Model 2

Total mark

10

Question 1 5 marks

A Write the scientific term of each of the following

1. An atom that has lost an electron or more during the chemical reaction. ()
2. A formula represents the number and the type of atoms in a molecule. ()
3. The amount of Earth's gravitational pull on an object. ()
4. Oxides that cause building corrosion. ()

B Give a reason for the following :

A chemical equation should be balanced.

Question 2 5 marks

A Put (✓) or (✗) :

1. Magnesium oxide is an ionic compound. ()
2. The valency of sulphur in sulphur trioxide (SO_3) is tetravalent ()
3. Sulphur oxides and nitrogen oxides are acidic gases. ()
4. By increasing the ratio of (CO_2), the air temperature decreases ()

B The weight of an object on Mars is 32 newton and on Earth is 80 newton. What's the gravitational acceleration on Mars if the gravitational acceleration on Earth is 10 m/sec^2

April Tests

Section 1

total mark

10

Question 1 5 marks

A Put (✓) or (x):

1. Safety belts in cars **work** on increasing the forces of inertia. ()
2. Gamma rays are used in treatment and discovering some swellings. ()
3. The Sun is our planet in the solar system. ()
4. Earth's radius between the two poles is smaller than at the equator. ()

B Give a reason for the following:

The density of the outer planets is low.

Question 2 5 marks

A Choose the correct answer :

1. All of the following are periodic motions, except the _____ motion.
a fan b pendulum c train d sunflower
2. The car brake performance is an application of forces.
a. gravitational b. friction c centrifugal d. inertia
3. Which of the following planets has the largest gravity on its surface ? _____
a. Mars. b Mercury. c Venus. d Earth.
4. Water masses on the Earth's surface form about _____
a 71% b 50% c 29% d 3%

B What happens when ... ?

A moving bus stops suddenly (concerning the passengers).

**Model 2**

Total mark

10

Question 1 5 marks**A** Write the scientific term of each of the following

1. Forces help in moving and stopping car and bus. ()
2. An object's position changes as time passes from initial position to a different final one. ()
3. A system that consists of thousands of millions of stars. ()
4. The most abundant gas in air. ()

B Calculate the distance in light year between two stars, if the distance between them equals 28.401×10^{12} km.

Question 2 5 marks**A** Correct the underlined words :

1. Friction causes a great loss of chemical energy. ()
2. Light waves are mechanical waves. ()
3. Venus is the third planet according to the distance from the Sun. ()
4. The water of oceans is fresh water. ()

B Give a reason for the following :

Infrared rays are used in cooking.

2

Final Revision

1

Final Revision

2

Final Revision

3

Final Revision



1 Definitions (or scientific terms):

1. Metals :	They are elements which contain 1 or 2 or 3 electrons in the outermost energy level
2. Nonmetals :	They are elements which contain 5 or 6 or 7 electrons in the outermost energy level.
3. Positive ion :	It is an atom of a metallic element that loses an electron or more during the chemical reaction
4. Negative ion :	It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.
5. Ion :	It is the atom which loses or gains an electron or more during the chemical reaction.
6. Noble (inert) gases :	They are elements which don't participate in any chemical reaction in ordinary conditions due to the completeness of their outermost energy levels with electrons.
7. Ionic bond :	It is a chemical bond resulted from the electric attraction between a positive ion and a negative ion.
8. Covalent bond :	It is a chemical bond originated between the atoms of nonmetals through sharing of each atom with a number of electrons to complete the outer electron shell of each atom.
9. Single covalent bond :	It is a chemical bond arises between two nonmetal atoms by sharing of one pair of electrons, where each atom shares the other atom with one electron.
10. Double covalent bond :	It is a chemical bond arises between two nonmetal atoms by sharing of two pairs of electrons, where each atom shares the other atom with two electrons.
11. Triple covalent bond :	It is a chemical bond arises between two nonmetal atoms by sharing of three pairs of electrons, where each atom shares the other atom with three electrons.
12. Valency :	It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.
13. Atomic group (radical) :	It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, has its own valency and it is not existed solely (individually).
14. Chemical formula :	It is a formula that represents the number and the type of atoms in a molecule
15. Acids :	They are substances dissociate in water producing positive hydrogen ions

16. Bases :	They are substances dissociate in water producing negative hydroxide ions.
17. Oxides :	They are compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.
18. Metal oxides :	They are compounds produced from the combination of oxygen with a metal
19. Nonmetal oxides :	They are compounds produced from the combination of oxygen with a nonmetal
20. Salts :	They are compounds resulted from the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen)
21. Chemical reaction :	It is the breaking of the existing bonds between the atoms of the molecules in the reactants and forming new bonds between the atoms of the molecules in the products.
22. Chemical equation :	It is a set of symbols and chemical formulae representing the reactants and products molecules in the chemical reaction and it represents the conditions of the reaction as well
23. The balanced chemical equation :	It is an equation in which the number of atoms entering a reaction equals the number of atoms resulting from this reaction.
24. Law of conservation of matter (mass) :	The sum of reactants masses in any chemical reaction equals the sum of products masses.
25. Law of constant ratios :	The chemical compound is formed from combination of its elements by constant weight ratios.
26. Direct combination reactions :	They are the reactions which involve a combination of two or more substances to form a new compound.

2 Give reasons for:

- 1. The number of electrons of an ion differs from that of its atom.**
Because the number of electrons in ion is less than or more than its number in the same atom by the number of lost or gained electrons.
- 2. The electric wires are manufactured of copper.**
Because copper is a metal which is a good conductor of electricity
- 3. When an atom gives an electron or more, it becomes a positive ion.**
Because the number of negative electrons becomes less than the number of positive protons.
- 4. When an atom gains an electron or more, it becomes a negative ion.**
Because the number of negative electrons becomes more than the number of positive protons.
- 5. The number of energy levels in the ion of a metallic element is less than the number of energy levels in its atom.**
Because the atom of a metallic element loses the electrons of the outermost energy level forming a positive ion.



- 6. A sodium atom ($_{11}\text{Na}$) tends to form a positive ion, while oxygen atom ($_8\text{O}$) tends to form a negative ion.**
Because sodium atom loses its outermost electron and changes into positive ion, while oxygen atom gains two electrons to complete its outermost level and changes into a negative ion
- 7. Noble gases don't participate in chemical reactions under the ordinary conditions.**
Due to the completeness of their outermost energy levels with electrons
- 8. Both sodium ion and oxygen ion have the same number of electrons.**
Because sodium ion is formed when sodium atom loses one electron and changes into (Na^+) which contains 10 electrons, while oxygen ion is formed when oxygen atom gains two electrons and changes into (O^{2-}) which contains 10 electrons too
- 9. It is impossible to combine sodium and magnesium together to form a compound.**
Because each of them is a metal and their atoms tend to lose the electrons of outermost energy level during chemical reactions.
- 10. The bond in magnesium oxide (MgO) molecule is an ionic bond [regarding that the atomic number for magnesium (Mg) = 12 and oxygen (O) = 8].**
Because magnesium loses two electrons and changes into positive ion, while oxygen gains the two electrons (which are lost by magnesium) and changes into negative ion, then electric attraction occurs between positive and negative ions
- 11. Ionic bonds produce compounds only not elements, but the covalent bonds produce both types an element or even a compound.**
Because ionic bond arises between two different atoms (metal and nonmetal) as a result of the electric attraction between a positive ion of an atom of a metallic element and a negative ion of an atom of a nonmetallic element, while covalent bond arises between two similar or different nonmetal atoms
- 12. When an atom of chlorine ($_{17}\text{Cl}$) is joined with an atom of sodium ($_{11}\text{Na}$), the product will be an ionic compound, but when two atoms of chlorine are joined together, the product will be a covalent molecule.**
Because chlorine atom (nonmetal) gains the electron which is lost by sodium atom, so an electric attraction occurs between positive sodium ion and negative chloride ion, while each of the two chlorine atoms share with one electron to complete its outermost shell.
- 13. The bond in a hydrogen molecule is a single covalent bond.**
Because it arises by sharing each hydrogen atom with only one electron to complete its outermost shell with two electrons and becomes more stable
- 14. The bond in an oxygen molecule is a double covalent bond.**
Because it arises by sharing each oxygen atom with two electrons to complete its outermost shell with 8 electrons and becomes more stable

15. The bond in water molecule is a single covalent bond.

Because oxygen atom shares each of the two hydrogen atoms with one electron.

16. The bond in nitrogen ($_7\text{N}$) molecule is a triple covalent bond.

Because it arises by sharing each nitrogen atom with three electrons to complete its outermost shell with 8 electrons and becomes more stable.

17. Potassium ($_{19}\text{K}$) is monovalent, while oxygen ($_8\text{O}$) is divalent.

Because during chemical reactions potassium atom loses one electron, while oxygen gains or shares with two electrons to complete their outermost shell

18. Both sodium ($_{11}\text{Na}$) and chlorine ($_{17}\text{Cl}$) are monovalent although they have different atomic numbers.

Because during chemical reactions, sodium atom loses one electron, while chlorine atom gains or shares with one electron to complete their outermost shell

19. The valency of noble gases is zero.

Because their outermost energy levels are completely filled with electrons so they don't lose, gain or share with any electrons.

20. Magnesium ($_{12}\text{Mg}$) is divalent, while aluminium ($_{13}\text{Al}$) is trivalent.

Because during chemical reactions magnesium atom loses two electrons, while aluminium atom loses three electrons

21. An oxygen atom combines with two atoms of sodium when composing one molecule of sodium oxide.

Because oxygen is a divalent, while sodium is a monovalent.

22. The chemical formula of sodium carbonate is (Na_2CO_3).

Because sodium is a monovalent, while carbonate is a divalent group, so two atoms of sodium combine with one atom of carbonate group.

23. The chemical formula of water is (H_2O).

Because oxygen is divalent, while hydrogen is monovalent, so two atoms of hydrogen combine with one atom of oxygen.

24. Acids have an effect on litmus paper which is different from bases.

Because acids change the colour of litmus paper into red while bases change the colour of litmus paper into blue.

25. All acids turn the colour of litmus into red and having a sour taste, while all bases turn the colour of litmus into blue with a bitter taste.

Because acids when dissolved in water produce positive hydrogen ions H^+ which responsible for their properties, while bases when dissolved in water produce negative hydroxide ions $(\text{OH})^-$ which responsible for their properties.



- 26. We can obtain sodium chloride (NaCl) solution and not silver chloride (AgCl) solution.**
Because sodium chloride is water soluble salt while silver chloride is water insoluble salt.
- 27. Caustic soda is from bases, while lead bromide is from salts.**
Because caustic soda contains negative hydroxide ion, while lead bromide is formed from combination of positive metal ion with negative nonmetal ion
- 28. A white powder is formed when a magnesium ribbon is burned in air.**
Due to the formation of magnesium oxide (white powder) as a result of combination of oxygen with magnesium.
- 29. A chemical equation should be balanced.**
To achieve the law of conservation of matter (mass).
- 30. The mass of magnesium is increased when it is burned.**
Because it combines with oxygen forming magnesium oxide.
$$2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$$
- 31. White clouds are formed when ammonia gas reacts with conc. hydrochloric acid.**
Due to the formation of ammonium chloride as white clouds
$$\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc}} \text{NH}_4\text{Cl}$$
- 32. Chemical reactions play an important role in our life.**
Because through which, it is possible to :
 - Obtain electric and heat energies used in some industries.
 - Obtain more useful substances from less used substances.
 - Prepare thousands of compounds are commonly used in many industries such as , manufacture of medicines, fertilizers, fuel, plastics, car batteries and food industries.
- 33. The use of chemical reactions is considered a double-edged weapon.**
Because some of them play a vital role in our life, while others have negative effects on both human beings and environment.
- 34. Burning of fuel is among the reactions that pollute the environment.**
Because it produces a lot of harmful gases that affect on humans and environment such as carbon, sulphur and nitrogen oxides
- 35. CO₂ gas acts as a greenhouse effect.**
Because it prevents the penetration of the thermal rays produced from the Earth to outer space.
- 36. Smoking is very harmful to health.**
Because it causes lung cancer.

37. **The spread of cancer tumors increases in the country that use coal as fuel.**
Because its burning causes air pollution with poisonous substances that infect humans with lung cancer.
38. **Burning of coal and cellulose fibers has bad effect.**
Because it causes air pollution and lung cancer.
39. **Carbon monoxide is a dangerous gas.**
Because it causes headache, fainting, severe stomach aches and may lead to death
40. **Sulphur oxides cause respiratory system malfunction and building corrosion.**
Because they are acidic gases
41. **Nitrogen oxides affect the nervous system and the eye.**
Because they are poisonous acidic gases.



What happens when...

1. You hammer on a piece of carbon and why ?

It will be fragmented easily, because carbon is from nonmetals which are not malleable

2. An atom loses one electron or more.

It changes into a positive ion carries a number of positive charges equals to the number of given electrons.

3. An atom gains one electron or more.

It changes into a negative ion carries a number of negative charges equals to the number of gained electrons.

4. An oxygen atom combines with a magnesium atom.

Magnesium loses two electrons and changes into a positive ion and oxygen gains the two electrons (which are lost by magnesium) and changes into a negative ion, then electric attraction occurs between positive and negative ions to form a molecule of magnesium oxide.

5. A chlorine atom combines with hydrogen atom.

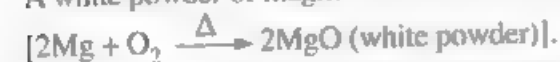
Each atom shares with one electron to become the outermost shell of each of them completed with electrons.

6. Two oxygen atoms combine together.

Each oxygen atom shares with two electrons to complete its outermost shell with 8 electrons and becomes more stable.

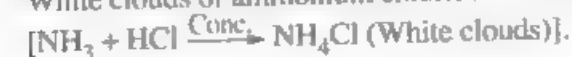
7. Burning a magnesium ribbon in air.

A white powder of magnesium oxide is formed.



8. Approaching a wet rod with hydrochloric acid to ammonia gas.

White clouds of ammonium chloride are formed.





9. Burning a piece of coal in air.

Carbon dioxide compound is formed.



10. The ratio of (CO₂) gas increases in air.

The temperature of air increases as (CO₂) causes the greenhouse effect

11. Burning of coal and cellulose fibres.

It causes air pollution and lung cancer.

4

Comparison

1 Comparison between the atom and the ion :

The atom	The ion
1 It is electrically neutral in its ordinary state	1 It is positive or negative electric charge
2 The number of electrons equals the number of protons.	2 The number of electrons is more or less than the number of protons.
3 Its outermost energy level is not completely filled with electrons except atoms of noble gases	3 Its outermost energy level is completely filled with electrons

2 Comparison between metals and nonmetals :

Points of comparison	Metals	Nonmetals
1. Physical state :	They are solids except [mercury (Hg) which is a liquid].	They are solids and gases except [bromine (Br) which is a liquid].
2. Metallic luster :	They have metallic luster.	They have no luster.
3. Malleable & ductile :	They are malleable and ductile.	They are not malleable or ductile
4. Electric & heat conduction :	They are good conductors of heat and electricity.	They are bad conductors of heat and electricity. [except graphite which is a good conductor of electricity].
5. No. of electrons in outer shell :	They have less than (4) electrons in the outermost energy level	They have more than (4) electrons in the outermost energy level.
6. Behaviour of atoms during the chemical reaction :	During the chemical reaction, their atoms tend to lose an electron or more and change into positive ions.	During the chemical reaction, their atoms tend to gain an electron or more and change into negative ions.

3 Comparison between a positive ion and a negative ion :

Positive ion	Negative ion
1. It is an atom of a metallic element that loses an electron or more during the chemical reaction	1. It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction
2. It carries a number of positive charges equals to the number of the lost electrons	2. It carries a number of negative charges equals to the number of the gained electrons.
3. The number of its electrons is less than the number of protons.	3. The number of its electrons is more than the number of protons.
4. The number of its energy levels is less than that of its atom	4. The number of its energy levels is equal to that of its atom

4 Comparison between an ionic bond and a covalent bond :

Ionic bond	Covalent bond
1. It arises between metal and nonmetal elements.	1. It arises between two nonmetal elements.
2. It is formed by losing and gaining of electrons.	2. It is formed by sharing of one pair of electrons or more
3. It is formed between two atoms of two different elements.	3. It may be formed between two atoms of the same or different elements.
4. It is formed due to the electrical attraction between the positive and negative ions	4. It is formed due to sharing of electrons between the atoms
5. It has one type.	5. It has three types (single, double and triple).
6. It produces compounds molecules only.	6. It produces elements and compounds molecules.

5 Comparison between single, double and triple covalent bonds :

Single covalent bond (–)	Double covalent bond (=)	Triple covalent bond (≡)
- It is a chemical bond arises between two nonmetal atoms by sharing of one pair of electrons, where each atom shares with one electron. <i>Ex.</i> : Hydrogen molecule (H – H)	- It is a chemical bond arises between two nonmetal atoms by sharing of two pairs of electrons, where each atom shares with two electrons. <i>Ex.</i> : Oxygen molecule (O = O)	- It is a chemical bond arises between two nonmetal atoms by sharing of three pairs of electrons, where each atom shares with three electrons. <i>Ex.</i> : Nitrogen molecule (N ≡ N)



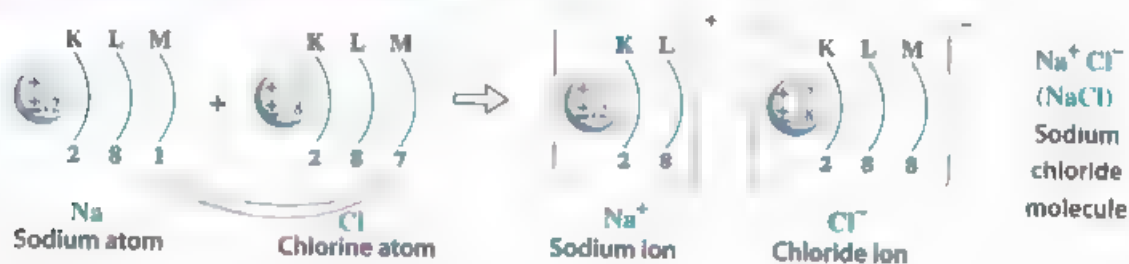
6 Comparison between acids and bases :

Points of comparison	Acids	Bases
1. Definition :	They are substances which dissociate in water producing hydrogen ions H^+ .	They are substances which dissociate in water producing hydroxide ions $(OH)^-$.
2. Symbol :	The symbol of all the mineral acids begins with hydrogen H	The symbol of all alkalis ends with (OH) group
3. Taste :	They have a sour taste	They have a bitter taste
4. Affecting on litmus paper :	They change the colour of litmus paper into red due to the presence of hydrogen ions H^+	They change the colour of litmus paper into blue due to the presence of hydroxide ions $(OH)^-$.
5. Examples :	H_2SO_4 & HCl	$NaOH$ & $Ca(OH)_2$

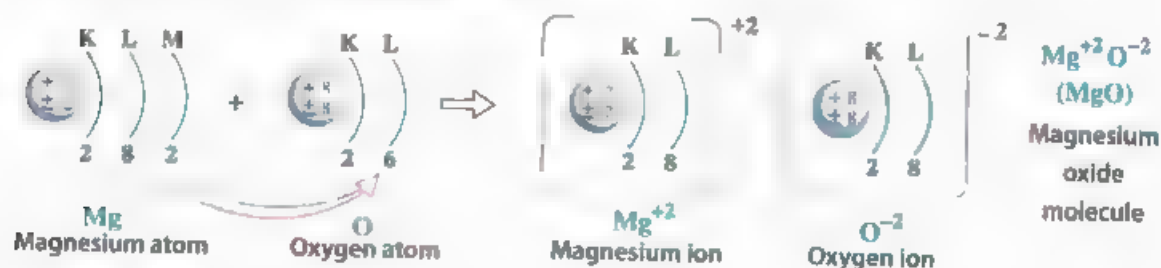


Some ionic molecules

1. Sodium chloride molecule ($NaCl$):

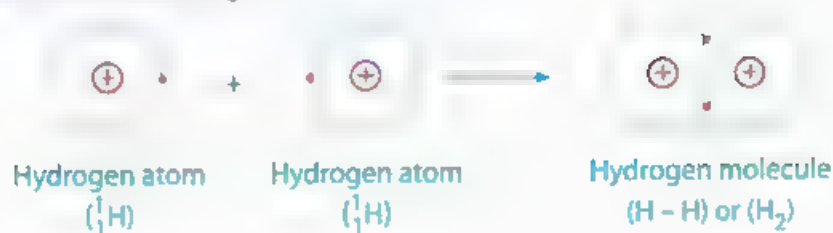


2. Magnesium oxide molecule (MgO):



Some covalent molecules

1. Hydrogen molecule (H_2) :



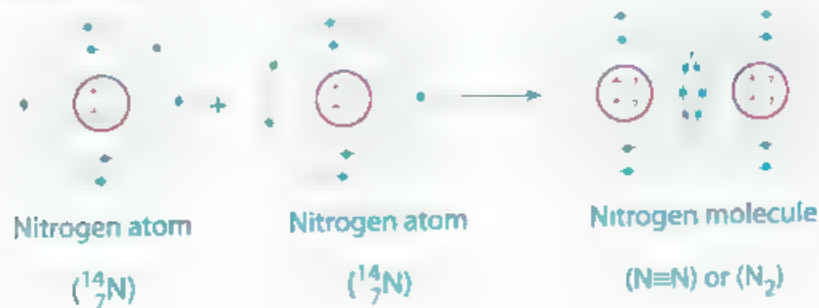
2. Water molecule (H_2O) :



3. Oxygen molecule (O_2) :



4. Nitrogen molecule (N_2) :





Some metallic and nonmetallic elements and their valencies

Metallic elements		Valency	Nonmetallic elements		Valency
Lithium	(Li)	Monovalent (1)	Hydrogen	(H)	Monovalent (1)
Potassium	(K)		Chlorine	(Cl)	
Sodium	(Na)		Fluorine	(F)	
Silver	(Ag)		Bromine	(Br)	
Copper I	(Cu)		Iodine	(I)	
Calcium	(Ca)	Divalent (2)	Sulphur	(S)	Divalent (2)
Magnesium	(Mg)		Oxygen	(O)	
Iron II	(Fe)		Nitrogen	(N)	Trivalent (3)
Lead	(Pb)		Phosphorus	(P)	
Copper II	(Cu)		Sulphur	(S)	Tetravalent (4)
Mercury	(Hg)	Trivalent (3)	Carbon	(C)	
Zinc	(Zn)		Nitrogen	(N)	Pentavalent (5)
Aluminium	(Al)		Phosphorus	(P)	
Gold	(Au)		Sulphur	(S)	Hexavalent (6)
Iron III	(Fe)				

Some atomic groups and their valencies

Atomic group	Formula	Valency
Hydroxide	(OH) ⁻	Monovalent (1)
Bicarbonate	(HCO ₃)	
Nitrate	(NO ₃) ⁻	
Nitrite	(NO ₂) ⁻	
Ammonium	(NH ₄) ⁺	
Carbonate	(CO ₃) ⁻²	Divalent (2)
Sulphate	(SO ₄) ⁻²	
Phosphate	(PO ₄) ⁻³	Trivalent (3)

9 Types of compounds and their examples

Types of compounds	Examples	Chemical formula	No. of elements forming the molecule	No. of atoms in the molecule
Acids	• Hydrochloric acid	HCl	2	2
	• Nitric acid	HNO ₃	3	5
	• Sulphuric acid	H ₂ SO ₄	3	7
Bases	• Sodium hydroxide	NaOH	3	3
	• Potassium hydroxide	KOH	3	3
	• Calcium hydroxide	Ca(OH) ₂	3	5
	• Aluminium hydroxide	Al(OH) ₃	3	7
	• Ammonium hydroxide	NH ₄ OH	3	7
Oxides	• Sodium oxide	Na ₂ O	2	3
	• Calcium oxide	CaO	2	2
	• Aluminium oxide	Al ₂ O ₃	2	5
	• Magnesium oxide	MgO	2	2
	• Carbon dioxide	CO ₂	2	3
	• Sulphur trioxide	SO ₃	2	4
Salts	• Sodium carbonate	Na ₂ CO ₃	3	6
	• Copper carbonate	CuCO ₃	3	5
	• Calcium carbonate	CaCO ₃	3	5
	• Sodium sulphate	Na ₂ SO ₄	3	7
	• Aluminium sulphate	Al ₂ (SO ₄) ₃	3	17
	• Sodium nitrate	NaNO ₃	3	5
	• Copper nitrate	Cu(NO ₃) ₂	3	9
	• Sodium phosphate	Na ₃ PO ₄	3	8
	• Aluminium phosphate	AlPO ₄	3	6



10 Chemical equations



11 Negative effects of chemical reactions

1 Burning of coal and cellulose fibres :

Such as burning paper and cigarettes cause air pollution and lung cancer

2 Fuel burning :

It is an example of environmental pollution due to the presence of harmful gases such as

A. Carbon oxides:

a. *Carbon monoxide (CO)* has a dangerous impact on the human being which causes

- Headache.
- Fainting.
- Severe stomach-aches and may lead to death.

b. *Carbon dioxide (CO₂)* acts as a **greenhouse**.

Increasing the ratio of carbon dioxide in the atmospheric air leads to **increasing the air temperature**.

B. Sulphur oxides :

Such as : a. Sulphur dioxide (SO₂).

b. Sulphur trioxide (SO₃).

- They are acidic gases that cause :

- Respiratory system malfunction (breathing problems).
- Building corrosion.

C. Nitrogen oxides :

They are acidic gases that are resulted from fuel burning during the time of lightning

- They are poisonous acidic gases that affect the nervous system and the eye

12 Activities:

Activity 1 To understand the concept of chemical reaction :**Steps :**

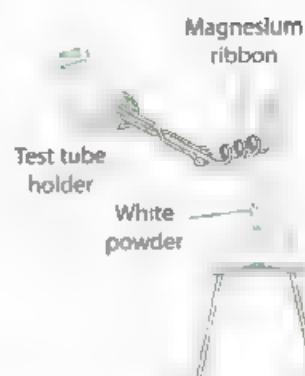
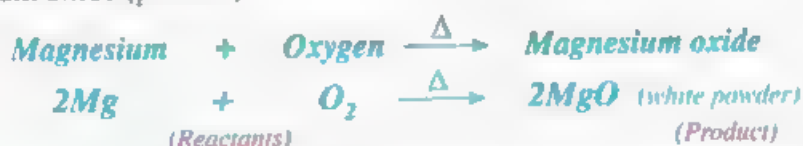
- Hold a piece of magnesium ribbon by a test tube holder
- Burn the ribbon in air.

Observation :

The solid magnesium ribbon burns and changes from a bendable bright solid into a white powder of a new substance.

Conclusion :

Magnesium reacts with atmospheric oxygen (reactants) to form a new substance which is magnesium oxide (product).

**Activity 2** To show the combination between ammonia gas (compound) and hydrochloric acid (compound) :**Step :**

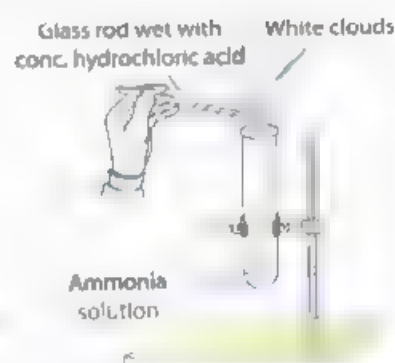
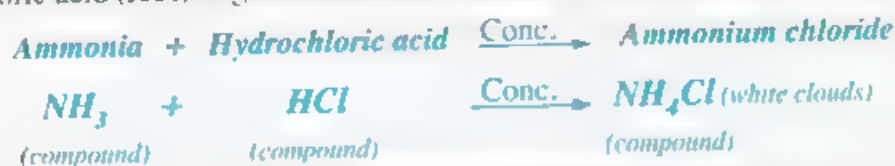
Place a glass rod wet with conc. hydrochloric acid (HCl) close to the mouth of a test tube containing ammonia solution.

Observation :

White clouds of ammonium chloride (NH_4Cl) are formed

Conclusion :

Ammonia gas (NH_3) [evolves from ammonia solution] combines with hydrochloric acid (HCl) to give ammonium chloride (NH_4Cl) (white clouds)



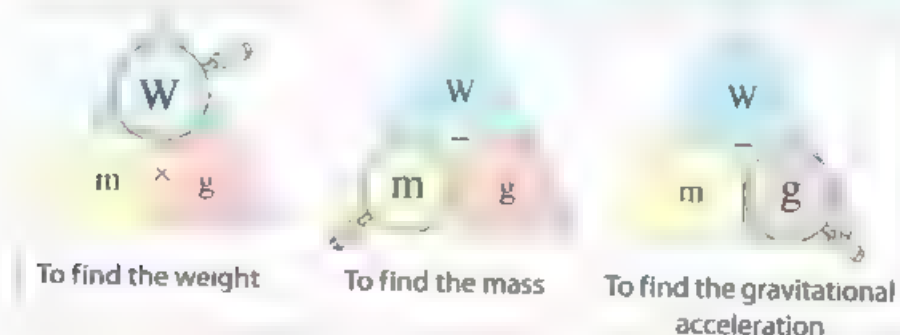
Definitions for scientific terms

1. Force :	It is an effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion
2. Object's weight :	<ul style="list-style-type: none"> It is the ability of the Earth to attract that object to its centre It is the force of Earth's <u>gravitational</u> to the object.
3. Centre of gravity :	It is the effective point of the object's weight that is located at its centre
4. Inertia :	It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.
5. Friction forces :	They are resistant forces (against motion) originated between the object in <u>motion</u> and the <u>medium touching</u> it.
6. Biological forces :	They are forces inside living systems that enable living organisms to do their different biological operations.
7. Speed :	It is the <u>distance covered</u> by an object in a <u>unit time</u> .
8. Relative motion :	It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference
9. The reference point :	It is a <u>fixed point</u> used to determine the object's position or to describe its movement.
10. Transitional motion :	It is the motion in which the object's position is changed relative to a fixed point from time to time between initial and final positions
11. Periodic motion :	It is a motion which is <u>regularly repeated</u> at equal periods of time.
12. Mechanical waves :	They are waves that need a medium to transfer through
13. Electromagnetic waves :	They are waves accompanied by electromagnetic forces and they don't need a medium to travel through.

2 Law and solved problems

$$\text{Object's weight (W)} = \text{Object's mass (m)} \times \text{Earth's gravitational acceleration (g)}$$

"Newton"
"kg"
"9.8 ≈ 10 m/sec²"




Problems

-  Find the weight of an object of 10 kg. (Knowing that the Earth's gravitational acceleration is 9.8 m/sec^2).

Solution

$$W = m \times g = 10 \times 9.8 = 98 \text{ newton}$$

-  Calculate the mass of an object, if its weight is 280 newton (Knowing that the Earth's gravitational acceleration is 10 m/sec^2).

Solution

Object's weight = Mass \times Earth's gravitational acceleration

$$\text{Mass} = \frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}} = \frac{280}{10} = 28 \text{ kg.}$$

Importance or uses

Item	Importance (or uses)
1. Electromagnet :	It is used in making of : • Electric winches which lift scrap iron and cars in ports • Electric bells.
2. Electric generator (Dynamo) :	It converts the mechanical energy into electric energy
3. Electric motor :	It converts the electric energy into mechanical energy
4. Weak nuclear force :	It is used to get radioactive elements and radiations which are used in : • Medicine. • Scientific researches. • Industry
5. Strong nuclear force :	It is used in : • Producing electricity • Military purposes

Technological applications

1 Technological applications of sound mechanical waves :

- Examining and curing equipments for the human body using sound waves (ultrasonic waves).
- Musical instruments
 - a Stringed musical instruments (contain strings) such as the violin, the lute and the guitar.
 - b Pneumatic musical instruments such as flute or reed pipe
- Amplifiers and devices of distributing and controlling sound used in broadcasting studios



Technological applications of electromagnetic waves :

1. Infrared (IR) rays :	They are used in : <ul style="list-style-type: none"> • Night vision systems used by modern military forces. • Remote sensing instrument to photographing the Earth's surface using satellites. • Cooking food. • Making remote sets.
2. Ultraviolet (UV) rays :	They are used to sterilize the sets of surgical operations rooms
3. X-rays :	They are used in : <ul style="list-style-type: none"> • Photographing bones to detect the sites of bone fractures. • Examining mineral raws in industry and showing errors, pores and cracks in these minerals.
4. Gamma rays :	They are used in medical purposes as the treatment and discovering of some swellings
5. Visible (seen) light :	It is used in : <ul style="list-style-type: none"> • Photographic cameras • Television cameras. • Light shows.

5 Give reasons for:

- The pencil is still in a static state on the desk.**
Because there is no force acts on it.
- The static ball moves when you kick it.**
Because the object changes its state when a proper force acts on it
- When you push a wall, it doesn't move.**
Because the force acting on the wall is improper.
- The mass of the object remains constant by changing its position on the Earth's surface.**
Because the mass of the object is the amount of matter that the object contains, and it doesn't change by changing the position.
- The weight of a bag of sugar equals 1 kg, a phrase is scientifically not accurate.**
Because the amount of 1 kg represents the mass of a bag of sugar and not its weight
- The weight of the object is always greater than its mass.**
Because the weight equals multiplying the mass of the object by Earth's gravitational acceleration.
- An object's weight is changed from place to another.**
Because Earth's gravitational acceleration changes from one place to another
- Gravitational acceleration changes on Earth's surface from place to another.**
Because the distance between the Earth's surface and the centre of the Earth changes from one place to another due to the non spherical shape of the Earth

9. **The weight of the object at the south pole is greater than its weight at the equator.**
Because the Earth's gravitational acceleration at the south pole is greater than the Earth's gravitational acceleration at the equator.
10. **The wrought iron attracts iron filings after putting it inside an electric coil.**
Because it is changed into a temporary magnet.
11. **The importance of dynamo in case of cutting off the electric current.**
Because it is used in generating of electric energy from mechanical energy
12. **Electric motor is used in the manufacture of the fans and the washing machines.**
Because it changes the electric energy into mechanical energy.
13. **The importance of nuclear force.**
Because it is used in medicine, industry and producing electricity
14. **The car passengers are rushed forward when the moving car stops suddenly.**
Due to inertia, as they try to maintain their state of motion.
15. **The car passengers are rushed backward when the car moves suddenly.**
Due to inertia, as they try to maintain their state of rest.
16. **The football player is rushed forward and falls if he is tripped during running forward.**
Due to inertia, as he tries to maintain his state of motion.
17. **Policemen advise drivers to use safety belts in cars and planes.**
Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.
18. **The fan is going to turn after the electric current goes off.**
Due to inertia, as its arms try to maintain its state of motion.
19. **Once you use the brakes of a moving bicycle, its speed decreases gradually until it stops.**
Because the friction between the tyre of the bicycle and the brakes generates a friction force against motion of the bicycle which leads to resist it.
20. **Cars that travel on snow have to carry chains that fit around the tyres.**
To increase friction to control the motion.
21. **When you drive a car in a city traffic for sometime, the brakes become hot.**
Because some mechanical energy is transferred into heat energy due to friction.
22. **You are able to run over grass much faster than you run over a ground covered with ice.**
Because friction with grass is more than friction with ice, so the motion is more controlled
23. **Car tyres are covered with a very coarse substance.**
To increase friction between tyres and the road to help car in starting and stopping motion.



- 24. • Spare parts of cars are covered with grease.**
• **Lubricating and oiling mechanical machines.**
To decrease friction between moving parts of machines and prevent their erosion.
- 25. The match is ignited when it is rubbed with a rough surface.**
Because friction forces generate heat energy that leads to ignition of match
- 26. The presence of oil stains on highways is very dangerous.**
Because the oil stains decrease the friction forces, so the driver can't control the vehicle.
- 27. Friction forces are double edged weapon.**
Because friction forces have benefits and also they have harms
- 28. Blood is pumped all over the body organs.**
Due to heart muscle contraction and relaxation.
- 29. The movement of trees and buildings related to a person in a moving car is considered a relative motion.**
Because the trees and buildings appear moving by the same speed of the car, but in the opposite direction
- 30. The train motion is considered as a transitional motion, while the pendulum's motion is a periodic motion.**
Because the train position is changed relative to a fixed point from time to time between initial and final positions, while pendulum's motion is regularly repeated in equal periods of time.
- 31. Transitional motion differs from periodic motion.**
Because transitional motion has initial and final points and it doesn't repeat its motion.
- 32. We receive the sunlight, but we don't hear the sound of solar explosions.**
Because the sunlight is electromagnetic waves which can travel through free space, while the sound of solar explosions is mechanical waves which can't travel through free space.
- 33. Astronauts can't hear each other voices directly in space.**
Because sound is mechanical waves which can't travel through free space.
- 34. We see lightning before hearing thunder although they occur at the same time.**
Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
- 35. Sound needs a medium to travel through, while light travels through space.**
Because sound is from mechanical waves, while light is from electromagnetic waves.

36. **Sound and water waves are mechanical waves.**
Because they need a medium to transfer through.
37. **Remote sets don't need a medium to control operating the electrical appliances.**
Because remote sets work by infrared rays (electromagnetic waves) which can travel through space.
38. **Infrared rays are used in cooking.**
Because they have heat effect property.
39. **X-rays are used in photographing bones.**
Because they detect the bone fractures.
40. **X-rays are used in examining mineral raws in industry.**
To show errors, pores and cracks in these minerals.
41. **Gamma rays have medical purposes.**
Because they are used to treat and discover some swellings (tumors).
42. **Exposing dental treatment tools for ultraviolet rays before reuse.**
To be sterilized before reuse.

What happens when...

1. **You kick a static ball with your foot. (Why)**
It will move, because there is a force acting on it.
2. **An attacker hits the moving ball with his head. (Why)**
It will change its direction, because the force acting on it can change the ball direction.
3. **You push a wall with your hand. (Why)**
It doesn't move, because the force acting on it is improper.
4. **The object's mass increases [relative to the object's weight]. (Why)**
The object's weight increases, because $\text{object's weight} = \text{object's mass} \times \text{Earth's gravitational acceleration}$.
5. **Migration of a bird from the south pole to the equator [related to : the mass and the weight of the bird]. (Why)**
The mass of the bird remains fixed, while the weight of the bird decreases, because the value of Earth's gravitational acceleration at the equator is less than that at the south pole.
6. **Approaching from Earth's centre [related to the Earth's gravitational acceleration]. (Why)**
The Earth's gravitational acceleration increases, because Earth's gravitational acceleration increases by approaching to the Earth's centre.
7. **Moving away from the centre of the Earth [according to : the mass and the weight of an object]. (Why)**
The weight of the object decreases, while its mass remains constant, because the mass doesn't change from a place to another, while the weight changes by changing the gravity.



8. **An astronaut moves from the Earth to the Moon [according to : the mass and the weight of the astronaut]. (Why)**
The mass of the astronaut remains constant, while his weight is changed, because the mass doesn't change from a place to another, while the weight changes by changing the gravity.
9. **An electric current flows through an isolated copper wire which is coiled spirally around a plastic tube containing iron bar and approach it to iron filings. (Why)**
The iron bar will attract the iron filings, because the iron bar is changed into a temporary magnet.
10. **Cutting off an electric current for an electromagnet lifts pieces of iron. (Why)**
Falling the pieces of iron, because the electromagnet loses its magnetic force.
11. **A moving bus stops suddenly [concerning the driver and the passengers].**
The driver and passengers will be rushed forward.
12. **A car at rest and suddenly moves forward [concerning the driver and the passengers].**
The driver and passengers will be rushed backward.
13. **You hit quickly a paper placed over a glass cup and a coin placed over the paper.**
The coin will fall in the cup.
14. **The passengers don't use the safety belts in cars.**
The passengers may be injured.
15. **You ride a bike along a flat road, then you use brakes.**
The bike slows down due to the friction force between the brakes and the tyres of the bike.
16. **Mechanical machines are not lubricated.**
Parts of machines getting hot and erosion occurs.
17. **Friction between two objects quickly [concerning their temperature].**
Their temperature will increase.
18. **Contraction and relaxation of body muscles.**
Movement of all body organs.
19. **Stopping the movement of a heart muscle [concerning the pulse inside the blood vessels].**
Stopping the pulse.
20. **Two objects move at the same speed and in the same direction.**
Both of them seem to be at rest to each other.
21. **A car next to your stopping car moves backward suddenly.**
You will imagine that your car moves forward
22. **A car next to your stopping car moves forward suddenly.**
You will imagine that your car moves backward.

Comparison

1 Comparison between mass and weight :

Mass	Weight
1. It is the amount of matter that the body contains	1. It is the force of Earth's gravitational to an object.
2. It is a fixed value.	2. It changes from a place to another on the Earth's surface.
3. Its measuring unit is kilogram .	3. Its measuring unit is newton .
4. $\text{Mass} = \frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$	4. $\text{Weight} = \text{Mass} \times \text{Earth's gravitational acceleration}$

2 Comparison between transitional motion and periodic motion :

Transitional motion	Periodic motion
1. It is a motion in which the object's position is changed from time to time relative to a fixed point.	1. It is a motion which is regularly repeated at equal periods of time.
2. It has initial and final positions <i>Examples :</i> - A bicycle motion. - A train motion. - A car motion.	2. It doesn't have initial or final positions. <i>Examples :</i> - A vibrating motion : As the motion of the simple pendulum. - A circular motion : As the movement of the Moon around the Earth. - A wave motion : As the motion of water waves

3 Comparison between mechanical waves and electromagnetic waves :

Mechanical waves	Electromagnetic waves
1. They are produced by the vibration of medium particles.	1. They are accompanied by electromagnetic forces
2. They need a medium to transfer through.	2. They spread in all media and free space.
3. Their speed is relatively low. <i>Examples :</i> • Sound waves. • Water waves.	3. Their speed is extremely high equals 300 millions m/sec. <i>Examples :</i> • Light waves. • X-rays. • Radio waves.



8 Activities

Activity 1 Earth attracts objects :

Steps :

- Put on the ground a set of objects that differ in mass (1 kg - 5 kg - 10 kg).
- Try to lift the masses and put them on a table beginning with the smallest mass then the next one in order.

Observation :

The exerted work to lift objects increases by increasing the object's mass.

Conclusion :

As the object's mass increases, the work done to lift the object upwards increases in the opposite direction of the Earth's gravitational.

Interpretation :

- The Earth attracts the objects to its centre by a force called "**Object's weight**".
- Object's weight increases by increasing the object's mass and vice versa



Activity 2 • To show the magnetic force of electric current : • The idea of how the electromagnet works :

Steps :

1. Coil the wire in a spiral shape around a plastic tube (as shown in the figure)
2. Insert the iron bar (or the iron nail) in the tube.
3. Connect the two ends of the wire to the battery.
4. Approach the iron bar (inside the tube) to the iron filings.

Observation :

The iron bar attracts the iron filings (as it is changed into a temporary magnet).

Conclusion :

Electric current has a magnetic effect.



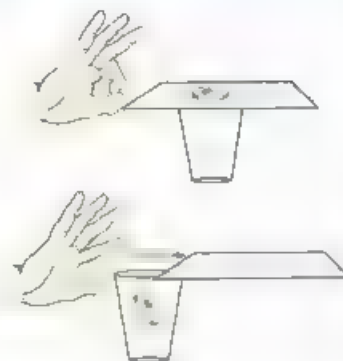
Activity

3

To show that objects resist change of rest state :

**Steps :**

1. Place a piece of construction paper on the top of a glass cup and put a coin on it
2. Use your forefinger to deliver a quick hit to the paper.

**Observation :**

The coin falls inside the cup.

**Explanation :**

The coin resists the sudden movement of the paper due to inertia, so it remains static, and falls in the cup.

**Conclusion :**

Force of inertia makes objects resist the change of their rest state.

Activity

4

To show that objects resist change in the state of motion :

**Steps :**

1. Carry some small plastic cubes on your palm and stretch your arm forward.
2. Walk forward fast and suddenly stop at once.

**Observation :**

The plastic cubes move forward and fall on the ground.

**Explanation :**

The cubes resist the sudden stopping of the palm of your hand due to inertia, so they continue in the state of motion and fall on the ground.
(The cubes move with the same speed of the person who carries them).

**Conclusion :**

Force of inertia makes objects resist the change of their motion.

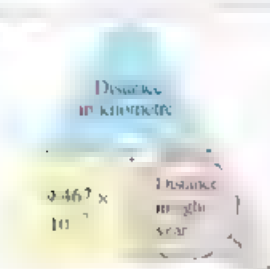
1 Definitions (or scientific terms)

1. Celestial bodies :	They are bodies swim in space such as stars, planets, moons and rocky or gaseous bodies.
2. Stars :	They are big-sized bodies that emit enormous amounts of heat and light
3. Light year :	It is the distance covered by light in one year and it equals 9.467×10^{12} km.
4. Galaxies :	<ul style="list-style-type: none"> • They are the greatest units that form the universe. • They are a tremendous collection of stars • They are a system that consists of thousands of millions of stars.
5. The Sun :	It is the star of our solar system.
6. Planets :	They are eight spherical opaque bodies revolve around the Sun in semi-circular or elliptical (oval) paths
7. Small (or inner) planets group :	They are the nearest four planets to the Sun in the solar system (Mercury, Venus, Earth and Mars).
8. Big (or outer) planets group :	They are the farthest four planets from the Sun in the solar system (Jupiter, Saturn, Uranus and Neptune).
9. Moons :	They are followers (small space bodies), that are affected by the gravity of the planets that rotate around them
10. Asteroids :	They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids
11. The belt of the wanderer asteroids :	It is a region that separates the group of the inner planets from the group of the outer planets.
12. Meteors :	They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
13. Meteorites :	They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface.
14. Comets :	They are masses of rocks, ice and solidified gases that revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.
15. The atmosphere :	It is a group of different gases that surrounds the Earth.
16. Soil :	It is a thin non-compacted layer, which covers the Earth's crust.

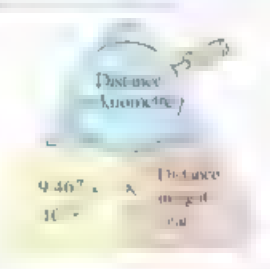
17. Rock :	It is a natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.
18. Magma :	It is a very hot thick (viscous) liquid underneath the Earth's crust
19. Lava :	<ul style="list-style-type: none"> • It is the magma when it reaches the Earth's surface. • It is the volcanic flows that spread on the volcanic sides
20. Igneous rocks :	They are rocks formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.
21. Sedimentary rocks :	<ul style="list-style-type: none"> • They are rocks formed from the cohesion of sediments. • They are rocks formed from the fragmentation and sedimentation of old rocks.
22. Metamorphic rocks :	They are rocks originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature.

Important law and solved problems

$$\text{Distance in light year} = \frac{\text{Distance in kilometre}}{9.467 \times 10^{12}}$$



To find the distance in light year



To find the distance in kilometre

Problems

- 1** Calculate the distance in light year between two stars. If the distance between them equals 28.401×10^{12} km.

Solution

$$\text{Distance in light year} = \frac{\text{Distance in kilometre}}{9.467 \times 10^{12}} = \frac{28.401 \times 10^{12}}{9.467 \times 10^{12}} = 3 \text{ light years.}$$

- 2** Calculate the distance in kilometre between the Sun and a star, if the distance between them equals 6 light years.

Solution

$$\begin{aligned} \text{Distance in kilometre} &= \text{Distance in light year} \times 9.467 \times 10^{12} \\ &= 6 \times 9.467 \times 10^{12} = 56.802 \times 10^{12} \text{ km.} \end{aligned}$$



Importance or uses

Item	Importance (or uses)
1. Telescopes :	They are used for identifying the celestial bodies.
2. Oxygen gas :	<ul style="list-style-type: none"> - It is used in respiration process of living organisms. - It helps in combustion (burning) process of fuels
3. Nitrogen gas :	<ul style="list-style-type: none"> - It reduces the effect of oxygen gas during burning processes. - Plants use it to form proteins.
4. Carbon dioxide gas :	It is used by green plants in photosynthesis process to form food for other living organisms.
5. Earth's atmosphere (concerning the meteors and meteorites) :	<p>The great expansion of atmosphere in the space helps in :</p> <ul style="list-style-type: none"> • Burning millions of small falling meteors completely before reaching the Earth's surface. • Reducing the high speed of large meteorites and burning a part of them before they hit the Earth's surface.
6. Ozone layer :	<p>It protects living organisms from the harmful ultraviolet rays</p> <ul style="list-style-type: none"> - Plants use it in photosynthesis process to form food. - Man and animal benefit from it in :
7. Water :	<ul style="list-style-type: none"> • Completing food digestion and absorption processes in the digestive system. • Sharing in blood formation. • Stabilizing the body temperature.
8. Gravity :	<p>It makes the life possible through :</p> <ul style="list-style-type: none"> - Constancy and steadfastness of objects and living organisms on the Earth's surface. - Steadfastness of the hydrosphere position on the Earth's surface. - Keeping the Earth surrounded by the atmosphere.

4 Give reasons for:

- The stars seem as light points although they are huge.
 - The stars seem as very small light points in spite of their big sizes. Because they are far from us.
- Astronomers do not measure the distances between stars in kilometres. Because these distances are too huge to be measured by kilometres
- Planets revolve around the Sun in fixed orbits. Due to the attraction force of the Sun to the planets.
- Mercury, Venus, Earth and Mars are called the inner planets. Because they are the nearest four planets to the Sun.

5. **The density of the inner planets is high.**
Because they consist of solid bodies.
6. **Jupiter, Saturn, Uranus and Neptune are called the outer planets.**
Because they are the farthest four planets from the Sun.
7. **The density of the outer planets is low.**
Because they consist mainly of gaseous bodies.
8. **The presence of hydrogen gas in a solidified state on the surface of outer planets.**
Due to the high pressure and extreme coldness on the surfaces of these planets
9. **The gravity on the Earth's surface is larger than that on Mars' surface.**
Because the mass of the Earth planet is larger than that of Mars planet and the force of gravity is directly proportional to the mass.
10. **The object weight is changed from a planet to another.**
Due to the difference in the gravity acceleration from a planet to another
11. **Moons are considered the followers of the planets.**
Because they rotate around the planets and they are affected by their gravity.
12. **Sometimes, we see some luminous lines in the sky at clear nights.**
Due to the burning of small rocky masses when they penetrate the Earth's atmosphere as a result of heat produced from their friction with air forming meteors
13. **No one can see Halley's comet more than two times in his life.**
Because it completes its revolution around the Sun every 76 years.
14. **The tropical radius is larger than the polar radius.**
Because the Earth is slightly flattened at its poles and indented outward at the equator.
15. **Concerning the volume, the Earth occupies the medium position in the solar system.**
Because it is the biggest inner planet and it is smaller than any planet from the outer planets
16. **The presence of a white colour surrounds the Earth.**
Due to the presence of the atmosphere that appears as a white colour around the Earth.
17. **Some rocky masses that fall from the space don't reach the Earth's surface.**
Because the expansion of atmosphere in space helps in burning millions of small falling meteors completely before reaching the Earth's surface
18. **Importance of ozone layer.**
Because it protects living organisms from the harmful ultraviolet radiations
19. **Temperature on the Earth's surface suits the life of living organisms.**
Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun.
20. **Steadfastness of the hydrosphere on the Earth's surface.**
Due to the gravitational force of the Earth.
21. **Keeping the Earth surrounded by the atmosphere.**
Due to the gravitational force of the Earth.



- 22. The presence of life on the surface of Earth planet only.**
 Due to :
- The presence of hydrosphere.
 - The presence of the atmospheric envelope containing oxygen gas which is needed for life.
 - Its temperature is suitable during both day and night.
 - Its atmospheric pressure and its gravitational force are suitable.
- 23. Earth's gravity makes life continue.**
 The Earth has a force of gravity that makes the life possible through :
- Constancy and steadfastness of objects and living organisms on its surface.
 - Steadfastness of the hydrosphere position on its surface.
 - Keeping the Earth surrounded by the atmosphere.
- 24. The Earth consists of many layers, each layer has its own characteristics.**
 As a result of the revolution of the Earth around its centre, the heavy metals descended towards the centre of the Earth and the light components in density ascended upwards, this led to the formation of a number of Earth's layers.
- 25. Scientists think that the inner part of the Earth was in a molten form.**
 Due to the high temperature of Earth's core.
- 26. • The Earth's inner core is rich in iron and nickel.**
 • Iron and nickel elements are collected around the centre of the Earth.
 Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.
- 27. The plant roots extend easily through the upper part of the Earth's crust but can't extend through its lower part.**
 Because the upper part is fragmented and loosened layer but the lower part is a solid material that consists of different types of rocks.
- 28. The crystals of minerals that form the plutonic igneous rock are large-sized.**
 Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize, so their crystals are large-sized.
- 29. The crystals of minerals that form the volcanic igneous rock are small-sized.**
 Because the minerals that form it don't take the time required for crystallization, where lava cools quickly on the surface, therefore their crystals become small-sized.
- 30. Volcanic rocks contain small circular holes.**
 Due to the extruding of gases from volcanic flows during their cooling and formation of rock.
- 31. Granite has a coarse texture, while basalt has a smooth texture.**
 Because the size of crystals of minerals forming granite is large, while the size of crystals of minerals forming basalt is small.
- 32. The components of granite rock can be seen by the naked eye.**
 Because it is a plutonic rock which has large crystals.
- 33. The components of basalt rock cannot be seen by the naked eye.**
 Because it is a volcanic rock which has very small crystals.

34. Limestone consists of mineral calcite.

Due to the precipitation of calcium carbonate in lime solutions.

35. Effervescence takes place when hydrochloric acid is added to a sample of limestone.

Due to evolving of carbon dioxide gas.

36. The cohesion of layers of sedimentary rocks increases by passing time.

Because the sediments exist in the lower layers are exposed to high pressure resulted from the weights of the deposits above them, this causes a decrease in the ratio of water existing between the grains.

37. We can differentiate between the sandstone and limestone from colour and texture.

Because sandstone is yellow in colour and its texture is coarse, while limestone is white in colour and its texture is smooth.

38. Some kinds of marble are coloured and others are white.

Because if it contains impurities, it is coloured and if it is pure, its colour is white.

**What happens when...****1. You look at the sky in a clear moonless night.**

Stars will be seen as light small points.

2. We can't invent the telescope.

We can't discover the celestial bodies.

3. The planet becomes nearer to the Sun.

It becomes hotter.

4. Travelling from Earth planet to Mars planet [related to the attraction force].

The effect of gravity force decreases.

5. • Several small asteroids penetrate the Earth's atmosphere.**• Friction of meteors with Earth's atmosphere.**

They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.

6. A large asteroid (meteorite) penetrates the Earth's atmosphere.

Its outer surface burns only and the remaining part of it without burning falls on the Earth's surface.

7. The air contains oxygen gas and is free of nitrogen gas.

The combustion processes will be fast, and proceed without any control.

8. There is no atmosphere.

There is no life

9. Absence of ozone layer in the atmosphere.

The ultraviolet rays will reach the Earth's surface and harm living organisms.

10. The Earth loses its gravity.

The Earth will not keep its atmosphere, the hydrosphere will not settle in its position and all objects on Earth's surface will move in a random way, that causes the difficulty in the continuity of life.



11. **The magma comes out of the Earth's surface.**
It is extruded in the form of volcanic flows and it is called lava.
12. **Decreasing the temperature of lava on the Earth's surface rapidly.**
Volcanic igneous rocks are formed.
13. **Decreasing the temperature of magma in the depths of Earth's crust slowly.**
Plutonic igneous rocks are formed.
14. **The minerals that form the plutonic igneous rocks take a long time for crystallization.**
Their crystals become large-sized.
15. **The minerals that form the volcanic igneous rocks take a short time for crystallization.**
Their crystals become small-sized.
16. **Extruding of gases from volcanic flows, which form the volcanic rocks.**
Small circular holes are formed inside the rocks.
17. **You pour a stream of water on a mixture of sand, shingle and gravel put in a rectangular basin.**
Water takes the smooth sand in its way and the sand deposits at the lower part, while shingle and gravel remain at the upper part.
18. **Increasing the pressure on the grains of rocks forming the layers of sedimentary rocks.**
The grains become solid and appear as layers above each other, the layers in the bottom are older and the above ones are more recent.
19. **You add hydrochloric acid to limestone.**
An effervescence takes place due to evolving of carbon dioxide gas.
20. **Sedimentary rocks are subjected to pressure and high temperature.**
They convert into metamorphic rocks.
21. **Melting of limestone by high temperature, then re-crystallization of the minerals forming it gradually.**
Marble is formed.
22. **Calcium carbonate precipitates in lime solution.**
Limestone is formed.

Important numbers and ratios

1. The light year	9.467×10^{12} km.
2 The density of inner planets	3.3 to 5.5 gm/cm ³
3 The density of outer planets	0.7 to 1.3 gm/cm ³
4 The acceleration due to gravity on the surface of Mercury planet :	3.78 m/sec ²
5 The acceleration due to gravity on the surface of Venus planet	8.60 m/sec ²
6 The acceleration due to gravity on the surface of Earth planet .	9.78 m/sec ²
7 The acceleration due to gravity on the surface of Mars planet	3.72 m/sec ²
8 The acceleration due to gravity on the surface of Jupiter planet .	22.88 m/sec ²

9 The acceleration due to gravity on the surface of Saturn planet	9.05 m/sec ²
10 The acceleration due to gravity on the surface of Uranus planet	7.77 m/sec ²
11 The acceleration due to gravity on the surface of Neptune planet	11.00 m/sec ²
12. No. of moons rotating around Earth planet :	1
13. No. of moons rotating around Mars planet :	2
14. No. of moons rotating around Jupiter planet :	62
15 No. of moons rotating around Saturn planet	60
16 No. of moons rotating around Uranus planet	27
17 No. of moons rotating around Neptune planet	12
18 The periodic time for Halley's comet around the Sun	76 years
19 The difference between the tropical radius and the polar radius	22 km.
20. The periodic time for rotation the Earth around the Sun	365.25 days
21 The distance between the Sun and the Earth	150 million kilometres
22. The average radius of the Earth	6386 km approximately.
23. The mass of the Earth :	5.9×10^{24} kg.
24. The ratio of oxygen gas in the atmospheric air :	21 %
25. The ratio of nitrogen gas in the atmospheric air :	78%
26 The ratio of carbon dioxide gas in the atmospheric air	0.03%
27 The ratio of water bodies concerning the area of Earth's surface .	71%
28. The ratio of land concerning the area of Earth's surface	29%
29 The ratio of salty water concerning the area of water bodies	97%
30 The ratio of fresh water concerning the area of water bodies	3%
31 The normal atmospheric pressure	76 cm.Hg.
32. The thickness of the Earth's crust :	8 – 60 km approximately.
33. The thickness of the mantle :	2885 km approximately.
34. The thickness of the outer core :	2100 km approximately.
35. The thickness of the inner core :	1350 km approximately.
36 The ratio of sedimentary rocks concerning the total volume of the Earth's crust rocks :	5%



Comparison

1 Comparison between stars, planets and moons .

Stars	Planets	Moons
They are big-sized bodies emit enormous amounts of heat and light.	They are spherical opaque bodies revolve around the Sun in elliptical orbits.	They are followers (small space bodies) that are affected by the gravity of the planets that rotate around them.

2 Comparison between meteors and comets :

Meteors	Comets
<ol style="list-style-type: none"> 1. They are celestial bodies burn up completely when they penetrate the atmosphere of the Earth as a result of the heat produced from their friction with air forming luminous arrows in the sky 2. They consist of small rocky masses. 	<ol style="list-style-type: none"> 1. They are celestial bodies revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets. 2. They consist of masses of rocks, ice and solidified gases.

3 Comparison between asteroids and planets

Asteroids	Planets
<ol style="list-style-type: none"> 1. They are rocky space bodies , most of them rotate in the region of the belt of wanderer asteroids. 2. They consist of thousands of different sized rocky masses. 	<ol style="list-style-type: none"> 1. They are eight spherical opaque bodies revolve around the Sun in elliptical (oval) orbits. 2. They consist of rocks or solidified gases.

4 Comparison between the inner planets and the outer planets .

Points of comparison	The inner planets	The outer planets
1. Definition :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
2. Their arrangement from the Sun :	Mercury - Venus - Earth and Mars.	Jupiter - Saturn - Uranus and Neptune.
3. Size :	Small in size	Big in size
4. Structure :	Rocky bodies	Gaseous bodies
5. Density :	High	Low
6. Atmosphere :	All of them have an atmosphere except Mercury.	All of them have an atmosphere.
7. No. of moons rotating around them :	A few number of moons (except Mercury and Venus have no moons)	Large number of moons

Comparison between oxygen, nitrogen and carbon dioxide gases :

Points of comparison	Oxygen gas	Nitrogen gas	Carbon dioxide gas
1. Their percentage in air :	21%	78%	0.03%
2. Importance :	<ul style="list-style-type: none"> - It is used in respiration process of living organisms. - It helps in combustion (burning) process of fuels. 	<ul style="list-style-type: none"> It reduces the effect of oxygen gas during burning processes. - Plants use it to form proteins 	It is used by green plants in photosynthesis process to form food for other living organisms.

Comparison between salty water and fresh water :

Salty water	Fresh water
1. It represents 97% of the water area on the Earth's surface.	1. It represents 3% of the water area on the Earth's surface.
2. It exists in : <ul style="list-style-type: none"> • Oceans. • Seas. 	2. It exists in : <ul style="list-style-type: none"> • Rivers. • Snow at the two poles. • Lakes. • Ground water.

Comparison between Earth's layers :

Points of comparison	Earth's crust	The mantle	The core	
			Outer core	Inner core
1. Order :	The first layer	The second layer	The third layer	
2. Formation :	It is a relatively light outer layer.	It is a rocky layer	It is a layer of molten metals.	It is a solid layer rich in iron and nickel.
3. Thickness :	Ranges between 8 – 60 km approximately	About 2885 km approximately	About 2100 km approximately	Its radius is about 1350 km approximately.

Comparison between magma and lava :

Points of comparison	Magma	Lava
1. Definition :	It is a very hot thick (viscous) liquid underneath the Earth's crust.	It is the magma when it reaches the Earth's surface.
2. The resulting rocks :	Plutonic igneous rocks.	Volcanic igneous rocks
3. Place of formation :	The depth of the Earth's crust	The Earth's surface

Comparison between plutonic and volcanic igneous rocks :

Points of comparison	Plutonic igneous rocks	Volcanic igneous rocks
1. Size of the crystals :	Large	Small
2. Texture :	Coarse	Smooth
3. Holes :	Absent	Present.



10 Comparison between granite and basalt rocks :

Points of comparison	Granite rock	Basalt rock
1. Kind :	Plutonic igneous rock	Volcanic igneous rock
2. Colour :	Pink or grey.	Dark in colour
3. Size of crystals :	Can be seen by naked eye	Cannot be seen by naked eye.
4. Found in :	The Eastern Desert and Sinai Peninsula.	Egypt in Abo-Zaabal, near Abou Rawash and El-Fayoum.
5. Minerals forming it :	Quartz, feldspar and mica	Olivine, feldspar and pyroxene

11 Comparison between sandstone and limestone .

Points of comparison	Sandstone	Limestone
1. Colour :	Yellow	White
2. Texture :	Coarse	Smooth
3. Minerals forming it :	Quartz.	Mineral calcite (calcium carbonate)
4. Reaction with dilute hydrochloric acid :	No reaction takes place.	A chemical reaction takes place with an effervescence due to evolving of carbon dioxide gas.

12 Comparison between types of rocks :

Points of comparison	Igneous rocks	Sedimentary rocks	Metamorphic rocks
1. Formation :	They are formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.	They are formed from the cohesion of sediments.	They are rocks originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature
2. Examples :	Granite and basalt	Sandstone and limestone	Marble

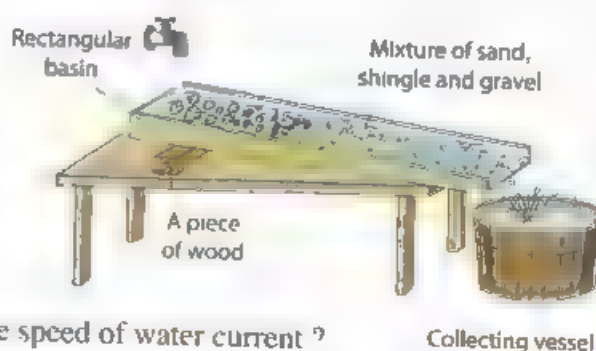
8 Activities:

Activity

To show transportation and deposition processes.

Steps :

- Bring a rectangular basin and place it in an inclined position.
- Put a mixture of sand, shingle and gravel at its upper part.
- Pour water upon this mixture.
- What do you notice when increasing the speed of water current ?



Observations :

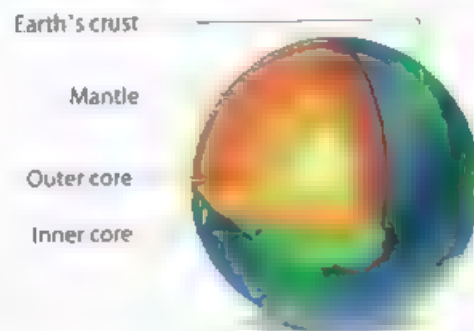
1. Water takes the smooth sand on its way and the sand deposits in the collecting vessel, while shingle and gravel remain in the rectangular basin.
2. If the speed of water increases, the size of the transported grains increases.

Similarly :

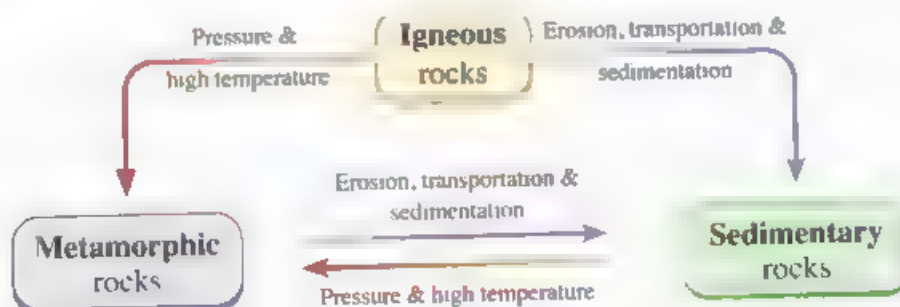
The water currents in seas and rivers transport the fragmented particles of rocks and deposit them above each other in the form of layers.

9 Important figures

1. Earth's layers :



2. The changes of rocks :



3

Final Examinations

Final Examinations of
Some Governorates 2023.



Final Examinations

of Some Governorates



2008

1 Cairo Governorate

El-Nozha Educational Zone

Answer the following questions :

Question 1

A Choose the correct answer :

- is an example of sedimentary rocks.
 - Granite
 - Basalt
 - Sandstone
 - Marble
- Sodium hydroxide molecule is considered as
 - an acid.
 - a base.
 - an oxide.
 - a salt.
- All non-metals don't conduct electricity, except
 - bromine.
 - graphite.
 - sulphur.
 - phosphorus.
- There is a triple covalent bond in molecule.
 - nitrogen
 - oxygen
 - chlorine
 - hydrogen

B Put (✓) or (✗) :

- The Earth's inner core is rich in iron and nickel. ()
- Water covers about 50% of the Earth's surface. ()
- Mechanical waves need a medium to transfer through. ()
- Valency of an element which has atomic number equals 20, is trivalent. ()

C What happen when approaching a wet rod with conc. hydrochloric acid to ammonia gas (write the equation) ?

Question 2

A Choose from column (B) what suits it in column (A) .

(A)	(B)
1. Acids	a. is from metamorphic rocks.
2. Inertia	b. used in making electric bells.
3. Marble	c. from forces that originate due to motion.
4. Electromagnet	d. change the colour of blue litmus paper into red.

B Complete the following sentences :

- and are insoluble salts in water.
- The passengers are rushed when the car stopped suddenly by the effect of force
- Comets are consists of and
- The elements of are solid, except is liquid.



- C** Give a reason for : the valency of noble gases is zero.

Question 3

- A** Correct the underlined words :

1. The salts dissolve in water producing negative hydroxide ion.
2. Due to friction in machines, light energy is produced.
3. The Earth occupies the fifth order according to the distance from the Sun.
4. The mantle is the solid layer of Earth rich in iron and nickel.

- B** Choose the odd words out, then write the scientific term of other

1. Motion of moon Motion of pendulum Train motion – Fan motion.
2. Chlorine – Potassium – Copper – Sodium.
3. Light waves – Sound waves – Microwaves – Radio waves.
4. Atmosphere – Hydrosphere – The gravity – Pollution.

- C** Write the chemical formula for aluminium hydroxide

Question 4

- A** Rewrite the following equations and complete it



- B** Write the scientific term :

1. Force responsible for steadfastness of the hydrosphere position on Earth's crust.
2. An effect attempts to change the object state from being static to motion or vice versa.
3. A type of chemical bonds which produce elements or compounds.
4. An atom of a metallic element that lost an electron or more during chemical reaction.

- C** What's the importance of hydrosphere of the Earth ? (one point)



Cairo Governorate

Heliopolis Educational Zone

Answer the following questions :

Question 1

- A** Complete the following sentences :

1. The atom of metallic element electrons during chemical reaction and change to ion.
2. The granite rock consists of .. , and ..

3. and from the accompanied forces to motion.
4. Igneous rocks are divided according to the place of their formation into and rocks

B Choose from column (B) what suits it in column (A) :

(A)	(B)
1. The atmosphere contain ozone layer	a. transfer through medium and space
2. From the metallic element	b. to achieve law of conservation of matter.
3. The chemical equation must be balanced	c. which protects the living organism from harmful rays.
4. The electromagnetic waves	d. ${}_{12}\text{Mg}$

C Write the balanced chemical equation of magnesium with oxygen according to law of conservation of matter.

Question **2**

A Write the scientific term :

1. Breaking the chemical bonds in reactants and forming new bonds in products.
2. Force inside living systems that enable to go their different operations.
3. The magma when it reaches the Earth's surface.
4. Rocks originated as a result of exposing the old rocks (igneous or sedimentary) to factors of pressure and high temperature.

B Complete the following table :

The atom	The ion type	Molecule or compound	The bond type
${}_{11}\text{Na}$	....(1).....	NaCl	(3)
${}_{17}\text{Cl}$	...(2).....	O_2	(4)

C Give a reason for lubricating and oiling mechanical machines.

Question **3**

A Put (✓) or (✗) :

1. The oxides result from combination oxygen with metallic element only. ()
2. The oxygen percentage in the air represent 78% from air volume ()
3. The safety belts prevent inertia force from being injured the car passenger when sudden change in motion occur. ()
- + The acids change litmus paper into red colour and bases change it into blue colour. ()

B Correct the underlined words :

1. From non-metallic elements that is good conductor of electric is oxygen.
2. The Earth p anet revolve around the Sun through 24 days



3. The mantle layer considered as layer of molten metals.
 4. The light from waves that need medium to transfer.
- C** An object mass equal 10 Km, if you know that the Earth's gravitational acceleration is 9.8 m/sec^2 . Calculate the object's weight.

Question 4

- A** Choose the **correct** answer :

1. The chemical formula of sodium hydroxide compound
 a. NaOH b. NaNO_3 c. Na_2O d. Na_2CO_3
2. From sandstone properties that it has
 a. white colour. b. coarse texture c. smooth texture. d. all the previous.
3. are examples of sedimentary rocks.
 a. Granite and basalt b. Marble and sandstone
 c. Sandstone and limestone d. Basalt and limestone
4. From insoluble salts
 a. silver chloride. b. sodium chloride.
 c. sodium carbonate. d. calcium nitrate.

- B** Cross out the odd words :

1. ${}^2\text{He}$ – ${}^{18}\text{Ar}$ – ${}^{10}\text{Ne}$ – ${}^{16}\text{S}$
2. The car motion – Train motion – The moon around Sun – Bicycle motion.
3. Oceans – Seas – Rivers – Salty lakes. 4. Marble – Basalt – Limestone – Quartz.

- C** What happen when atom gains an electron or more during chemical reaciton ?

3 Cairo Governorate

East Naser City Educational Zone

Answer the following questions :

Question 1

- A** Complete the following sentences :

1. gas occupies 21% of the components of the Earth's atmosphere, while nitrogen gas represents %
2. wave is electromagnetic wave, but wave is mechanical wave.
3. The Earth inner core is rich in and .
4. On dissolving acid in water, it gives positive ions, while alkali gives negative ions.

- B** Write chemical formula for each of the following

1. Aluminium oxide. 2. Sodium carbonate.
3. Calcium chloride. 4. Magnesium hydroxide.

- C** Calculate the weight of an object its mass equals 10 kg (gravity = 9.8 m/sec^2).

Question 2

A Write the scientific term :

1. An instrument which changes the electric energy to magnetic energy.
2. A thin non-compacted layer which covers the Earth's crust.
3. The number of electrons gained, lost or even shared during a chemical reaction
4. A molten material that exists at depth beneath the crust.

B Put (✓) or (✗) :

1. The rock is formed of one mineral or a group of minerals. ()
2. All non metals are bad conductor of electricity except graphite ()
3. The mantle layer lies beneath the Earth's outer core. ()
4. Mechanical waves need a medium to transfer through. ()

C Calculate the masses of reactants and products in the following reaction, knowing that the mass of (O = 16 gm, Mg = 24 gm)



Question 3

A Choose the correct answer :

1. The triple covalent bond is formed in molecule.
a. hydrogen b. nitrogen c. oxygen d. water
2. is produced from conversion of limestone.
a. Granite b. Marble c. Basalt d. Sandstone
3. The valency of ferrous is
a. zero. b. monovalent. c. divalent. d. trivalent.
4. From the periodic motion the motion.
a. pendulum b. car c. train d. person

B Correct the underlined words :

1. Car brakes are from the applications of gravitational force.
2. Granite consists of olivine, pyroxene and feldspar.
3. Number of atoms in $\text{Ca}_3(\text{PO}_4)_2$ is 10 atoms.
4. The Earth occupies the fifth position according to its distance from the Sun

C Give reason for : the car passengers are rushed forward when the moving car stops suddenly.

Question 4

A Write an example for :

1. Liquid metal.
2. Salt dissolves in water.
3. Sedimentary rock.
4. Force inside living organisms.



B What's the importance of ... ?

1. Gravity. 2. Nitrogen. 3. Electromagnet. 4. Friction force.

C What happen when an atom loses one electron or more ?



Cairo Governorate

El-Waily Educational Zone

Answer the following questions :

Question 1

A Choose the correct answer :

- The layer which consists of molten metals is the
a. crust. b. outer core. c. mantle. d. inner core.
- The idea of machine lubrication depends on the decreasing of the
a. object weight. b. inertia. c. friction forces. d. gravity.
- Electromagnetic forces affect on the performance of the following, except for
a. dynamo (generator). b. electric motor.
c. electromagnet. d. car internal combustion engine.
- The inertia force affects the bodies.
a. moving b. static c. moving and static d. no correct answer

B Two elements (X & Y) have atomic number (11 & 17 respectively).

First : 1. Show by drawing how the chemical bond is formed between them.

2. What is the type of this bond ?

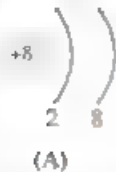
Second : Which of the following :

1. Neutral nonmetal

2. Negative ion

3. Nobel gas

4. Positive ion



C Calculate the mass of an object if its weight is 50 Newton (knowing that the Earth's gravity is 10 m/s^2).

Question 2

A Correct the underlined words :

- The major component of atmosphere is oxygen gas
- The Earth is the fourth planet according to the distance from the Sun.
- Granite is a sedimentary rock.
- Inner core of the Earth is rich in iron and aluminium.

B Complete the following sentences :

1. The motion of simple pendulum is _____, while the motion of a toy car is _____.
2. Ozone layer protects living organisms from the harmful _____ rays.
3. The waves causing motion are divided into two types which are _____ and _____.
4. Compounds can be classified according to their properties into acids, _____, _____ and ..

C Give reason for : we receive the sunlight and we don't hear the sound of solar explosions at the same time.**Question 3****A Write the scientific term :**

1. Compounds that dissolve in water producing positive hydrogen ion (H^+).
2. An instrument used to change the electric energy to magnetic energy.
3. The number of electrons gained, lost or shared by an atom during chemical reactions.
4. An object's position changes as the time passes from its initial position to the final position.

B Write the chemical formula of :

- | | |
|-----------------------|--------------------|
| 1. Calcium hydroxide. | 2. Silver nitrate. |
| 3. Magnesium oxide. | 4. Sulphuric acid. |

C Compare between : sandstone and Limestone**Question 4****A Put (✓) or (✗) :**

1. Water masses on Earth's surface forms about 30%. ()
2. Mass is an attraction amount of Earth to a body. ()
3. Mercury is the only liquid metal. ()
4. The periodic motion is the change of object's position or direction as time passes relative to another object. ()

B Give one word for each of the following statements

1. Compounds produced as a result of combination of a positive metal ion with negative nonmetal ion.
2. It is an effect attempt to change the object's phase from static to motion or vice versa or change the direction.
3. The measuring unit of the weight.
4. Substances that have less than (4) electrons in their outermost energy levels.

C What happens when decreasing the temperature of magma in the depths of Earth's crust slowly ?

Answer the following questions :

Question 1

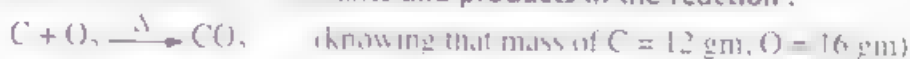
A Complete the following sentences :

1. A object's changes from a place to another on Earth's surface, whereas its remains fixed.
2. The valency of ($_{18}\text{Ar}$) is, while that of (CO_3) is
3. Electromagnet is used to make..... and
4. According to the law of conservation of mass, the sum of masses equal the sum of masses in chemical reaction.

B Mention an example for :

1. Nonmetal liquid element.
2. Electromagnetic wave.
3. Rock produced from conversion of limestone.
4. Trivalent atomic group.

C Find the masses of reactants and products in the reaction :



Question 2

A Write the scientific term :

1. Changing the object's position as time passes from its initial position of final one.
2. Compounds dissolve in water producing positive hydrogen ions.
3. Type of chemical bond arises between hydrogen atom and chlorine atom
4. Volcanic igneous rock.

B Mention the number that indicates the following statement :

1. The distance between Sun and Earth.
2. Number of electrons in ($_{19}\text{K}$) ion
3. The thickness of mantle layer of Earth.
4. The percentage of N_2 gas in air

C Calculate the mass of an object its weight is 460 newton, knowing that the Earth's gravitational acceleration is 10 m/sec^2 .

Question 3

A Choose the odd word then write the scientific term to the other word :

1. Inertia – Friction – Attraction force – Biological force.
2. NaOH – KOH – HgO – Ca(OH)_2
3. Quartz – Olivine – Feldspar – Mica.
4. Sound waves – Ultraviolet waves – Infrared rays – Visible light.

B Put (✓) or (✗) :

1. Simple pendulum motion is a wave motion. ()
2. The normal atmospheric pressure is 71 cm.Hg. ()
3. The bond in potassium chloride molecule is ionic bond. ()
4. Pulses inside blood vessels is from fundamental forces in nature ()

C In the reaction of ammonia gas with conc hydrochloric acid :

1. Write the equation.
2. Mention the type of the reaction.
3. Mention the type of produced compound.

Question 4**A** Choose the correct answer :

1. Layer consists of molten metals is the
 a. crust. b. mantel. c. outer core. d. inner core.
2. Car brakes are one of the applications on force.
 a. friction b. inertia c. nuclear d. gravitational
3. From the sedimentary rocks
 a. basalt. b. granite. c. sandstone. d. mica.
4. All of the following are metallic oxides, except
 a. Na_2O b. MgO c. SO_3 d. Al_2O_3

B Complete the following table :

Chemical formula	NaOH	(3)	HCl	CO_2
Name	..... (1)....	Zinc Sulphate	(5)	(7)
Type	..... (2).....	(4)	(6)	(8)

C What is meant by Force ?

Dokki Educational Zone

Answer the following questions :

Question 1**A** Complete the following sentences :

1. Acids change the colour of litmus paper into _____, while bases change the colour of litmus paper into
2. The car passengers are rushed _____ when the car stops suddenly by the effect of _____ force.
3. The bond in oxygen molecule is _____ bond, while the bond in nitrogen molecule is _____ bond.
4. Granite is from _____ igneous rocks, while basalt is from _____ igneous rocks.



B Choose the odd words :

1. NaOH / KOH / $\text{Mg}(\text{OH})_2$ / HCl.
2. Chlorine / Potassium / Copper / Sodium.
3. Gravitational force / Biological force / Electromagnetic force / Nuclear force
4. Erosion / Solidification / Transportation / Sedimentation.

C Calculate the weight of an object if its mass is 10 Kg knowing that the Earth's gravity acceleration is 9.8 m/sec^2 .

Question 2

A Choose the correct answer :

1. The metamorphic rocks are produced as a result of the effect of _____ on rocks
a high temperature b. high pressure c (a) and (b) d no correct answer
2. The car brake performance is an application of _____
a gravitations force. b friction force. c centrifuge forces. d forces of inertia
3. The valency of magnesium ($_{12}\text{Mg}$) is
a. divalent. b. trivalent. c. monovalent. d. no correct answer.
4. All of these elements can participate in chemical reactions, except _____
a sodium ($_{11}\text{Na}$) b nitrogen ($_7\text{N}$) c hydrogen ($_1\text{H}$) d neon ($_{10}\text{Ne}$)

B What happens if ... ?

1. An atom gains one electron or more 2 There is no atmosphere.
- 3 Approaching a wet rod with conc. hydrochloric acid to ammonia gas.

C Write the chemical formula for each of the following :

1. Sodium carbonate. 2. Aluminium oxide.

Question 3

A Give reasons for :

1. Chemical equation should be balanced.
- 2 Policemen advise drivers to use safety belts in cars and planes.
3. Object's weight changes from one place to another on the Earth's surface
4. Astronauts can't hear each other voices directly in space.

B Compare between each of the following :

1. Metals and non metals (2 points). 2. The Earth's crust and the mantle.
3. Sandstone and marble (type of rock). 4. Ionic bond and covalent bond

C Give one importance of ozone layer.

Question 4

A Put (✓) or (✗) in front of each of the following statements .

1. Water molecule consists of four atoms for two elements. ()
2. The Earth's radius between the two poles is larger than that at the equator. ()

3. MgO is an example of metal oxide. ()
4. The chemical bond in sodium chloride is ionic bond. ()

B Write the scientific term :

1. The only nonmetal that exists in a liquid state.
2. The number of electrons gained, lost or even shared with an atom during a chemical reaction.
3. The effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the motion direction.
4. A gas that is used by green plants in photosynthesis.

C Give an example of transitional motion.



Agoza Educational Zone

Answer the following questions :

Question 1

A Choose the correct answer :

1. All of non metals don't conduct electricity, expect
a. bromine. b. aluminium. c. graphite. d. mercury.
2. Water bodies on the Earth's surface form the percentage of
a. 50% b. 71% c. 40% d. 30%
3. is a force found in the living system.
a. Inertia b. Brake
c. Pulse in blood vessels d. Centrifugal
4. Limestone is a type of rocks.
a. sedimentary b. igneous c. metamorphic d. no correct answer

B Write down the electronic configuration of the atoms then indicate the type of each atom (metal – nonmetal – nobel gas) :

1. Mg₁₂ 2. Ar₁₈ 3. O₈ 4. Ca₂₀

C Calculate the mass of an object, its weight is 100 newton in a place on the Earth (knowing that the Earth's gravity in this place = 10 m/sec²).

Question 2

A Write the scientific term :

1. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
2. A rock formed of lava flows when it comes on the Earth's surface.
3. The motion which is regularly repeated in equal periods of time.
4. The Earth's attraction force to an object.

Answer the following questions :

Question 1

A Complete the following sentences :

1. The bond in sodium chloride is
2. Marble is produced from the conversion of ..
3. The Earth's inner core is rich in and
4. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Catalyst}}$
5. elements don't participate in chemical reactions in ordinary conditions.

B Give a reason for :

1. Policemen advice drivers using safety belts in cars and planes
2. Acids solutions change blue litmus paper into red.

C Give an example of a salt doesn't dissolve in water.

Question 2

A Choose the correct answer :

1. The car brake performance is an application of
a. attraction forces b. friction forces c. inertia forces d. centrifugal forces.
2. All the following are metals, except
a. iron. b. oxygen. c. copper. d. sodium.
3. is a pink or grey coloured rock.
a. Basalt b. Granite c. Sandstone d. Limestone
4. All the following are examples of periodic motion, except
a. fan. b. bicycle. c. pendulum. d. wave.
5. Water masses on the Earth's surface from about
a. 30% b. 50% c. 71% d. 90%

B Problem :

Find the weight of an object, its mass is 50 kg, if the Earth's gravity acceleration is 9.8 m/sec^2 .

C Write the chemical formula of :

1. Sulphuric acid.
2. Sodium hydroxide
3. Aluminium oxide

Question 3

A Write the scientific term :

1. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
2. A hot thick liquid underneath the Earth's crust.



3. A kind of periodic motion, which describes the movement of the moon around the Earth.
4. Breaking of the bonds in the reactants molecules and forming new bonds in the products.
5. They are the waves which need a medium to transfer through.

B Compare between :

Positive ion and negative ion (according to the definition and an example)

C What happens when burning of magnesium ribbon in air ?

Question 4

A Correct the underlined words :

1. Friction causes great loss of chemical energy.
2. Non-metals are bad conductors of electricity, except sulphur.
3. Green plants use oxygen gas in photosynthesis process.
4. Ozone layer protects the living organisms from the harmful infrared rays.
5. The outer layer of the Earth is known as the mantle

B Mention one importance :

Nitrogen gas.

C Identify the type of compound :

1. HCl

2. MgO

3. NaCl

4. KOH

Alexandria Governorate

West Educational Zone

Answer the following questions :

Question 1

A Complete the following sentences :

1. The bond in oxygen molecule is .. bond, but in water molecule is bond.
2. Sandstone and are examples of rocks.
3. When a car is at rest and moving suddenly, the passengers due to force.
4. Plutonic rocks have crystals with size, while volcanic rocks have crystals with size.

B Correct the underlined words :

1. Negative ions have number of energy levels less than that in their atoms.
2. The motion of simple pendulum is circular motion.
3. Oxygen gas enters in formation of protein.
4. The water of oceans is fresh water.

C If the Earth's gravitational acceleration in a place 10 m.s^{-2} Find the weight of an object if its mass 56 kg.

Question 2**A** Choose the correct answer :

- All non-metals don't conduct electricity, except
a. bromine. b. sulphur. c. graphite. d. oxygen.
- From the examples of forces inside living organisms is/are
a. inertia. b. pulse inside blood vessels.
c. breaks. d. friction.
- All the following characteristics support the continuity of life on the Earth, except
a. temperature. b. atmosphere.
c. attraction force. d. electromagnetic force.
- Earth is the planet regarding to the volume (ascendingly)
a. 1st b. 2nd c. 3rd d. 4th

B Put (✓) or (✗) in front of the following statements

- Some elements have more than one valency such as nitrogen (N) ()
- Earth's radius between the two poles is smaller than that at the equator. ()
- Marble is igneous rocks. ()
- Ozone layer protects living organisms from the harmful infrared rays ()

C Show by a chemical equation reaction between ammonia gas and conc. hydrochloric acid.**Question 3****A** Write the scientific term :

- Breaking down the bonds between atoms of reactant molecules and formation of new bonds of products molecules.
- Compounds are dissociated in water producing (OH⁻) ions.
- Wave which need a medium to transfer through.
- Magma, when it reaches the Earth's surface.

B Give one example of the following :

- Salt does not dissolve in water.
- Transitional motion.
- Source of salty water.
- Igneous rocks.

C Give a reason for , lubricating and oiling machines parts**Question 4****A** Choose the odd word out of the following

- H₂O – HBr – HCl – HNO₃
- Radio waves – Microwaves – Sound waves – X-rays.
- NO₃ – NH₄ – NO₂ – OH
- Earth's crust – Atmosphere – Mantle – Core.

- B Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Carbon dioxide gas	a. reaction between element and element.
2. Earth's crust	b. the movement of moon around Earth.
3. Circular motion	c. an outer layer, its thickness ranging between 8 – 60 km.
4. $2\text{CO} + \text{O}_2 \longrightarrow 2\text{CO}_2$	d. reaction between element and compound.
	e. form about 0.03% of the air volume.

- C By knowing the atomic masses of (Ca = 40 gm, O = 16 gm, H = 1 gm) :

Name of compound	Chemical formula	No. of atoms	Mass of one molecule
Calcium hydroxide	..... (1) .....	..... (2)	(3) gm

10 Alexandria Governorate

Montazah Educational Zone

Answer the following questions :

Question 1

- A Choose the **correct** answer :

- The Earth is located in the according to its distance from the Sun.
a. third b. fifth c. fourth d. seventh
- Electromagnet is used in making
a. microscope. b. calculator. c. electric bell. d. microwave.
- The car brake is an application of
a. inertia. b. friction force. c. attractions force. d. gravity.
- All the following turns the litmus paper into red, except
a. HCl b. H_2SO_4 c. HNO_3 d. NaOH

- B Correct the underlined words :

- The bond between two atoms of oxygen is ionic bond.
- Metamorphic rocks are formed under three stages erosion, transportation and sedimentation
- The symbol of carbonate atomic group is NH_4
- The valance of $_{11}\text{Na}$ is di-valenc.

- C Find the weight of an object its mass is 50 kg.

(g = 10 m/sec²)

Question 2

- A Write the scientific term :

- The number of electrons in which the atom loses, gains or shares.
- The bond that is formed between metals and nonmetals

3. Motion is repeated regularly at equal period of times.
4. Rocks are formed from magma or lava after cooling.
5. Elements having 1 or 2 or 3 electrons in the outermost energy level
6. A gas represents 78% of the Earth atmosphere.

B Find the total mass of the reactants and the products through the following reaction



C What happen to the force of inertia when we use safety belts in the car ?

Question 3

A Complete the following sentences :

1. Limestone is from rocks.
2. The layer in the atmospheric air protects the living organisms from harmful rays.
3. Non-metals are bad conductor of electricity, except
4. $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta}$

B Write the name of each compound then mention its type (oxide – base – acid – salt) :

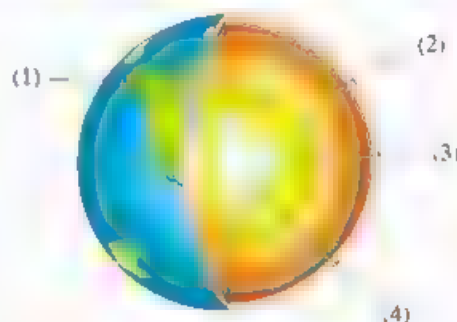
1. NaOH
2. CaO
3. HCl
4. NaCl

C Give reasons for we see the lightning then we hear the thunder.

Question 4

A Label the drawing :

1.
2.
3.
4.



B Choose from column (B) what suits it in column (A) .

(A)	(B)
1. Vibrational motion	a. car motion.
2. Circular motion	b. motion of sound waves.
3. Wave motion	c. motion of the moon around the Earth.
4. Translational motion	d. motion of simple pendulum.

C Mention one importance for the presence of carbon dioxide gas in the Earth's atmosphere.

Answer the following questions :

Question 1

A Write the scientific term :

1. The process of breaking the chemical bonds between the atoms of the molecules of the reactants and formation of new bonds between the atoms of products molecules
2. The change in the position of an object over time relative to a reference point with time.
3. An atom of metallic element that lost one or more electrons during a chemical reaction.
4. Natural solid materials found in the Earth's crust consisting of one mineral or a group of minerals.

B Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Earth's crust	a. It is repeated regularly at equal intervals of time.
2. Periodic motion	b. It turns the colour of the red litmus paper into blue
3. KOH	c. A rock layer with a thickness of 2885 km.
4. Mantle	d. Its thickness ranges from 8 – 60 km.

C Calculate the weight of a body with a mass of 10 kg.

(Knowing that the acceleration due to gravity is 9.8 m/s^2)

Question 2

A Choose the correct answer :

1. The layer is rich in iron and nickel.
a. inner core b. crust c. mantle d. outer core
2. A compound containing six oxygen atoms is
a. sodium oxide b. calcium nitrate. c. sodium carbonate d. calcium hydroxide.
3. The inertia forces affect .. bodies
a. moving b. static c. moving and static d. no correct answer
4. Salty water represents % of the volume of water on the planet.
a. 96 b. 97 c. 98 d. 99

B Correct the underlined words :

1. Green plants use oxygen gas in the process of photosynthesis.
2. The pulse inside the blood vessels is from the forces of inertia
3. The chemical formula for aluminium oxide is AlO
4. The bond in the magnesium oxide molecule is single covalent bond

- C** If the atomic mass of carbon is ($C = 12$) and the atomic mass of oxygen is ($O = 16$). Calculate the total masses of the reactants and products in the following reactions.



Question 3

- A** Cross out the odd word :

1. Nitrite – Nitrate – Sulphate – Hydroxide.
2. Marble – Basalt – Quartz – Limestone.
3. Corrosion of machine parts – Generating heat – Liquids transferring – Loss of part of mechanical energy.
4. $NaNO_3$ – HNO_3 – $AgCl$ – $NaCl$

- B** Mention one example for each of :

1. A sedimentary rock.
2. An inert gas.
3. The reaction between compound with another compound (symbolic equation)
4. Surface igneous rock (volcanic).

- C** What happens when an electric current is passed through an insulated copper wire wrapped around an iron rod ?

Question 4

- A** By using the following words between brackets complete the following sentences :
(Mechanical – Magma – Ferrous – Acids – Lava – Ferric – Electromagnetic – Alkalis)

1. The sound of thunder is _____ waves, while the light of lightning is _____ waves
2. A very hot and thick substance at a great depth inside the Earth is called _____ and after it comes out on the surface of the Earth, it is called ..
3. _____ dissociate in water producing positive hydrogen ions, while _____ dissociate in water producing negative hydroxide ions.
4. The iron ion (Fe^{+2}) is called _____, while the iron ion (Fe^{+3}) is called _____

- B** Put (✓) or (✗) :

1. Gravity helps the Earth to maintain (keep) its atmosphere ()
2. The work done to lift an object up decreases with the increase in its mass. ()
3. Feldspar mineral is found in the structure of both granite and basalt ()
4. The number of known elements till now is 112 elements. ()

- C** Complete the following table :

Atom	Electronic configuration	Element type	Ion type
${}_{9}F$	..... (1) .....	..... (2)	(3)



12 El-Sharkia Governorate

10th of Ramadan Educational Zone

Answer the following questions :

Question 1

A Write the scientific term :

1. Substances that dissociate in water to give positive hydrogen ions.
2. The change in an object's position as time passes relative to another object.
3. A rock resulting from the conversion of limestone.
4. An extremely hot, thick molten substance under the Earth's crust.

B Put (✓) or (✗) :

1. Element $_{13}\text{X}$ combines with oxygen $_{8}\text{O}$ to form a compound of formula X_2O_3 ()
2. The ozone layer protects the Earth by absorbing infrared radiation. ()
3. When a moving bus stopped suddenly, the passengers and drivers rushed forward. ()
4. We hear the thunder before seeing lightning. ()

C What happens to the astronaut's mass when he travels from the Earth to the moon.

Question 2

A Complete the following sentences :

1. Plants use _____ gas in photosynthesis and _____ gas in respiration.
2. Sound waves are _____ waves, while light waves are _____ waves.
3. _____ and _____ are minerals found in granite in addition to feldspar.
4. The bond between $_{12}\text{Mg}$ and $_{8}\text{O}$ is _____ and the bond between two atoms of $_{7}\text{N}$ is _____

B Choose the correct answer :

1. The seat belt is an application on force.
a. inertia b. nuclear c. friction d. gravitational
2. The percentage of the water area in proportion to the Earth is %
a. 21 b. 3 c. 50 d. 71
3. The chemical formula of sodium hydroxide is
a. LiOH b. NaOH c. NaCl d. KCl
4. The volcanic igneous rock which has dark coloured is
a. sand. b. granite. c. basalt. d. marble.

C Show by balanced chemical equation. What happen when approaching a glass rod wet with conc. hydrochloric acid close to the mouth of a test tube containing ammonia solution.

Question 3

- A Choose from column (B) what suits it in column (A)

(A)	(B)
1. Table salt formula	a. Na_2SO_4
2. Atmospheric pressure on Earth's surface	b. in the work of the cranes
3. Sodium sulphate formula	c. NaCl
4. The electromagnet enters	d. 76 cm.mercury.
	e. 72 cm.mercury.

- B Correct the underline words :

1. Bromine is a liquid metal.
2. The inner core of the Earth is a molten state.
3. Lubricating the machines decreases the weight force.
4. Soil is a thin non-compacted layer in the Earth's mantle layer

- C Calculate the weight of a body of mass 9 kg, if you know that its gravitational acceleration is 10 m/s^2 .

Question 4

- A Cross out the odd word, then write what links between the rests

1. Person's motion – Train motion – Fan motion – A bicycle motion.
2. SO_4^{2-} – KOH – NO_3^- – NH_4^+
3. Earth's core – Mantle – Ozone – Earth's crust.
4. MgO – HCl – CO_2 – NO_2 .

- B Write the scientific term :

1. The force which helps in burning match.
2. The number of electrons gained, lost or even shared with an atom during a chemical reaction
3. A layer of molten metals with a thickness 2100 km.
4. Rocks that are formed when old rocks are subjected to pressure and high temperature.

- C Calculate the masses of the reactants and products in the following reaction.



knowing that : (C = 12 , O = 16)

13 El-Gharbia Governorate

Science Inspectorate

Answer the following questions :

Question 1

- A Choose the correct answer :

1. The only nonmetal that exists in a liquid state is
a. bromine. b. chlorine. c. hydrogen. d. nitrogen.



2. The nitrate group is a group.
 a. monovalent b. divalent c. trivalent d. tetravalent
3. The sum of reactants masses in any chemical reaction is the sum of products masses.
 a. doubled b. more than c. equal to d. less than
4. is the scientist who discovered the Earth's gravitational force
 a. Planck b. Newton c. Archimedes d. Coulomb
- B** Write the chemical formula for the following compounds .
 1. Hydrogen chloride. 2. sodium carbonate.
 3. Calcium sulphate. 4. Aluminium oxide.
- C** Give reason for : acids have an effect on litmus paper which is different from bases.

Question 2

- A** Complete the following sentences :
- The valency of noble gases is as their outermost energy level is with electrons.
 - Atoms of tend to lose an electron or more during the chemical reaction and change into ions.
 - The measuring unit of the object's mass is, while that of its weight is
 - Types of motion are motion and motion.
- B** Choose the odd word out, then write the scientific name of the rest :
- Gravitational forces - Friction forces - Nuclear forces - Electromagnetic forces.
 - A person motion - A simple pendulum motion - A car motion - A train motion.
 - Potassium - Calcium - Magnesium - Lead.
 - Calcium nitrate - Sodium sulphide - Silver chloride - Sodium chloride
- C** Compare between ionic bond and covalent bond.

Question 3

- A** Write the scientific term :
- A set of atoms joined together, behave like one atom only, having a certain valency and it can't be existed solely.
 - Breaking the reactants bonds and forming new ones among the products.
 - Resistant forces (against motion) originated between the object in motion and the medium touching it.
 - The distance covered by an object in a unit time.
- B** Put (✓) or (x) :
- Water waves are electromagnetic waves. ()
 - Ozone layer protects the living organisms from the harmful ultraviolet rays ()

3. The bond in water molecule is an ionic bond. ()
4. An element of atomic number 20, so its valency is divalent. ()

C Explain the idea of operation of electromagnet.

Question 4

A Write the chemical equation representing the following reactions

1. Heating a magnesium ribbon in air.
2. Carbon burning in the presence of oxygen.
3. Conc. hydrochloric acid is combined with ammonia gas.
4. The reaction between nitrogen monoxide and oxygen.

B Identify the type of the following compounds

- | | | | |
|--------|--------------|--------|-------------|
| 1. KOH | 2. H_2SO_4 | 3. MgO | 4. NH_4Cl |
|--------|--------------|--------|-------------|

C Calculate the mass of an object if its weight is 980 Newton and the Earth's gravitational acceleration is 9.8 m/sec^2 .

14 Dakahlia Governorate

Science Inspectorate

Answer the following questions :

Question 1

A Complete the following sentences :

1. When a glass rod wet with conc. hydrochloric acid close to the mouth of a tube contains ammonia solution cloud of is formed.
2. An object's changes from a place to another on the Earth's surface whereas its remains constant.
3. gas reduces the effect of oxygen gas during burning process and the plant use it to form
4. Chemical formula of sulphuric acid is and chemical formula of limewater is ..

B Choose the correct answer :

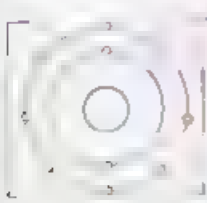
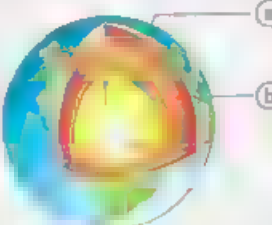


1. Among the elements ${}_9A$, ${}_{10}B$, ${}_{11}C$, ${}_{19}D$ the two elements that can form ionic bond are
 a. B and C. b. C and A. c. C and D. d. B and D.

Question 4

A Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Hydrogen gas	a. third position in view of the distance from the Sun.
2. Oxygen gas	b. fifth position in view of the distance from the Sun.
3. Iron III chloride	c. used in respiration process
4. Earth occupies in the solar system	d. each atom share by one electron in its molecule.
	e. FeCl_3
	f. FeCl_2

B Answer according to each picture :

			
<p>1. Mention the type of the element of this ion and its atomic number.</p>	<p>2. Label (a) and (b)</p>	<p>3. Give reason for your observation.</p>	<p>4. Mention the type of motion.</p>

C From the following atomic groups and ions [Ag^+ - H^+ - PO_4^{3-} - O^{2-}] write the chemical formula of the following compounds :

1. A salt.
2. Metal oxide.
3. An acid.

Answer the following questions :

Question 1

A Complete the following sentences :

1. The bond in sodium chloride molecule is , while the bond in nitrogen molecule is
2. The motion of pendulum is periodic motion, while the motion of the Moon around the Earth is periodic motion.
3. The Earth occupies the position according to the distance from the Sun and the order according to the volume (ascendingly).
4. Limestone is from rocks, while granite is from rocks.



B Choose the unsuitable word :

1. Sodium chloride – Silver chloride – Calcium nitrate – Sodium sulphide
2. Gamma rays – X-rays – Sound waves – Visible light.
3. Crust – Soil – Mantle – Core.
4. Erosion – Transportation – Lava – Sedimentation.

C Calculate the weight of an object its mass is 100 Kg. (knowing that the acceleration of Earth's gravity = 9.8 m/sec^2).

Question 2

A Choose the correct answer :

1. Covalent bond arises between elements.
a. two metallic b. two nonmetallic c. metal and nonmetal d. metal and inert gas
2. The chemical formula of sodium nitrite is
a. Na_2O b. NaNO_2 c. NaNO_3 d. Na_2CO_3
3. When the moving car stops suddenly, passengers
a. rush forward. b. rush backward c. tend to right d. tend to left
4. The Earth's inner core rich in and elements.
a. iron, sodium b. iron, nickel c. copper, nickel d. chromium, nickel

B Give one example for each of the following

1. Volcanic igneous rock
2. An acid
3. Transitional motion
4. A gas used in making photosynthesis process

C Classify the type of each of the following compounds

1. $\text{Ca}(\text{OH})_2$
2. CO_2
3. K_2SO_4

Question 3

A Correct the underlined words :

1. The metallic atom that lost an electron or more is called the **negative ion**.
2. Caustic soda is called **potassium** hydroxide.
3. Car brakes are from applications of **inertia**.
4. Marble is one of **sedimentary** rocks.

B Choose from column (B) what suits it in column (A) :

(A)	(B)
1. The number of atoms in the molecule of Al_2O_3	a. 97
2. The number of elements in the molecule Na_2CO_3	b. 71
3. Normal atmospheric pressure = cm.Hg.	c. 3
4. The percentage of water bodies relative to the area of Earth's surface = %	d. 5
	e. 76
	f. 6

C Give reason for . we see lightning before hearing thunder.

Question 4**A** Put (✓) or (✗) in front of the suitable statement :

1. Chemical equation must be balanced. ()
2. Sodium hydroxide solution turns the colour of litmus paper into red. ()
3. Magma is a very cold thick material underneath the Earth's crust ()
4. The water of the sea is fresh water. ()

B Write the scientific term for each of the following :

1. It is the motion in which the object's position is changed relative to a fixed point from time to time between initial and final position.
2. A natural solid material that exists in the Earth's crust and it consists of one mineral or a group of minerals.
3. Elements that have luster and good conductors of heat and electricity.
4. A gas which is used by plant in making protein.

C Write the chemical equation that represents the reaction between ammonia gas and concentrated hydrochloric acid then indicate the type of reaction.**16** Ismailia Governorate

Science Inspectorate

Answer the following questions :

Question 1**A** Complete the following sentences :

1. Granite is from rocks, while sandstone is from rocks
2. The most famous comet is and it completes its revolution around the Sun every years.
3. The chemical formula of sodium carbonate is , while that of aluminium oxide is
4. The motion of simple pendulum is motion, while the motion of train is motion.

B Give an example :

1. Salt dissolves in water.
2. One use of electromagnet.
3. Layer protects the Earth from harmful rays.
4. Gas reduces the effect of oxygen in burning.

C Give a reason for : using safety belts in cars and planes.**Question 2****A** Write the scientific term :

1. A very hot viscous liquid which exist underneath the Earth crust.
2. The distance covered by light in one year.
3. Breaking down the bonds between reactants to produce new ponds in the product.
4. The resistance force originated between the object in motion and the medium touching it.



B Correct the underlined words :

1. The bond in oxygen molecule is ionic bond.
2. Earth completes one revolution around the Sun every 24 hours.
3. The outer core layer lies beneath the Earth crust.
4. Kilogram is the measuring unit of weight.

C Write the balanced chemical equation representing when heating magnesium ribbon in air.

Question 3

A Choose the correct answer :

1. is produced from conversion of limestone.
a. Marble b. Olivine c. Pyroxene d. Sandstone
2. When nitrogen (${}_7\text{N}$) gains electrons to complete its outer energy level, it becomes
a. N^{+3} b. N^{-2} c. N^{-3} d. N^{-}
3. is liquid nonmetal.
a. Mercury b. Water c. Bromine d. Oxygen
4. If the mass of an object decreases, the weight will .
a. increase to double. b. decrease. c. still constant. d. increase 4 times.

H Choose the odd word out and write the relation between the other :

1. $\text{CaO} - \text{Ca}(\text{OH})_2 - \text{CO}_2 - \text{NO}_2$ 2. Mercury - Earth - Sun - Jupiter
3. Quartz - Mica - Feldspar - Basalt.
4. Light wave - Sound wave - Radio wave - Microwave.

C What happen when electric current passes through a coil coiled around iron nail ?

Question 4

A Compare between :

1. Metals and nonmetals, (according to heat conduction).
2. Acid and base, (according to the colour of litmus paper).
3. Inner core and outer core. (according to the thickness).
4. Mechanical waves and electromagnetic waves (according to transferring through space)

B Put (✓) or (✗) :

1. Heart muscle contraction and relaxation is one of the forces inside living system. ()
2. Meteors burn completely when they penetrate the atmosphere ()
3. Green plants use oxygen gas to make protein. ()
4. Carbon the only metal which conduct electricity. ()

C The opposite figure represents electronic configuration of an element, find :

1. The type of element.
2. The type of its ion.
3. Its valency.



17 Behiera Governorate

Science Inspectorate

Answer the following questions :

Question 1

A Choose the correct answer :

1. The element which has atomic number 12 is considered from
a. metals. b. nonmetals. c. noble gases. d. non correct answer.
2. The valency of ferrous is
a. monovalent. b. divalent. c. trivalent. d. tetravalent.
3. The bar used in the electromagnet is made up of ..
a. isolated copper. b. steel iron. c. wrought iron. d. aluminium.
4. Electric fan still works for few seconds after cutting the electric current due to force.
a. electromagnetic b. gravitational c. inertia d. friction

B Give reasons for the following :

1. We receive the sunlight and we don't hear the sound of solar explosions
2. The Earth's inner core is rich in iron and nickel.

C Mention an example of each of the following :

1. An igneous rock.
2. A metamorphic rock.

Question 2

A Write the scientific term :

1. Magma when it reaches the Earth's surface.
2. Motion which is regularly repeated in equal periods of time.
3. Breaking the reactants bonds and forming new ones among the products
4. They are resistant forces originated between the object in motion and the medium touching.

B Write the chemical formula for the following compounds :

1. Calcium nitrate.
2. Sulphuric acid.

C Knowing that the mass of carbon (C) is 12 and oxygen (O) is 16.

Find the total mass of reactants and products through the following reaction :



Question 3**A Complete the following sentences :**

1. On dissolving in water, acids give positive ions and alkalis give negative ions
2. The radius of the Earth is about 22 km larger than the radius.
3. consists of sand grains, that are less than in diameter.
- 4 The Earth occupies the position according to the distance from the Sun, where it's far from the Sun about km.

B Choose the odd word out and write the scientific term of others :

1. Erosion – Solidification – Transportation – Sedimentation.
- 2 A person motion - A simple pendulum motion - A car motion - A train motion.

C Calculate the mass of an object if its weight is 280 newton (knowing that the Earth's gravitational acceleration is 10 m/sec^2).**Question 4****A Put (✓) in front of the right statement and (x) in front of the wrong one :**

1. The mass of a person at the equator is less than its mass at the two poles ()
2. Water waves are electromagnetic waves. ()
3. Water keeps the body temperature constant. ()
4. The bond in water molecule is an ionic bond. ()

B Two elements (x) and (y) have atomic number (11) and (17) respectively :

1. Show by drawing how the chemical bond is formed between them.
2. What is the type of this bond ?

C Write the chemical equation representing the following reactions, then indicate the type of each reaction :

1. Conc. hydrochloric acid is combined with ammonia gas.
2. Heating a magnesium ribbon in air.

Answer the following questions :

Question 1**A Choose the correct answer :**

1. During the chemical reaction $_{12}\text{Mg}$ loses its outermost electrons and changes into
 a. Mg^+ b. Mg^- c. Mg^{+2} d. Mg^{-2}
- 2 is produced from the conversion of limestone.
 a. Granite b. Marble c. Basalt d. Sandstone

3. The outer core of the Earth is
 a. solid. b. gaseous. c. liquid. d. molten.
4. The measuring unit of force is .
 a. kg. b. joule. c. gram. d. newton.

B Correct the underlined words :

1. Due to friction in machines, light energy is produced.
2. Plutonic rocks contain small circular holes.
3. The common name of sodium chloride is caustic soda.
4. The Earth occupies the third order regarding volume.

C What is meant by the weight of an object equals 30 newton ?

Question 2

A Complete the following sentences :

1. The valency of argon is _____, while the valency of mercury is _____.
2. The motion of simple pendulum is motion, while the motion of the train is motion.
3. _____ is the molten material that exists beneath Earth's crust as a thick fluid and after its going out on Earth's surface in the form of volcanic flows its known as _____.
4. The Earth revolves around the Sun by the action of _____ and the distance between the Earth and the Sun is about

B Choose the odd word out then write the scientific term for the rest :

1. Light waves – Sound waves – Radio waves – Microwaves.
2. Atmosphere – Hydrosphere – Gravity – Pollution.
3. Na_2O – CaO – NaCl – MgO
4. Mica – Quartz – Olivine – Feldspar.

C Calculate the total mass of reactants and products knowing that the mass of (H = 1, O = 16)



Question 3

A Write the scientific term :

1. An atom loses or gains an electron or more during the chemical reaction.
2. Waves that don't need a medium to travel.
3. Substances dissolve in water giving (OH^-) .
4. It protects the living organisms from the harmful ultraviolet rays coming from the Sun.

- B** Give an example showing each of the following :
1. A nonmetal that has more than one valency.
 2. A biological force.
 3. Factor causes the conversion of sedimentary rocks to metamorphic rocks.
 4. Gas reduces the effect of oxygen during the burning processes.
- C** Give a reason for : policemen advice drivers to use safety belts in cars.

Question 4

- A** Write the number that indicates each of the following :
1. Atoms in aluminium sulphate molecule.
 2. The normal atmospheric pressure on Earth.
 3. The number of well known elements till now.
 4. The thickness of the mantle layer.
- B** Put (✓) or (x) :
1. When an atom changes into an ion, the mass number remains without any change ()
 2. The rock is formed of one mineral or a group of minerals ()
 3. The exerted work to lift an object increases by increasing the object weight. ()
 4. Igneous rocks are formed in three stages which are disintegration, transportation and deposition. ()
- C** What happens when approaching a wet rod with conc. hydrochloric acid to ammonia gas (write a balanced chemical equation) ?

19 Assistant Governorate

Science Inspectorate

Answer the following questions :

Question 1

- A** Complete the following sentences :
1. Inner core is rich in and nickel.
 2. Sound waves are example of waves.
 3. When hydrochloric acid is added to limestone, gas is evolved.
 4. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{conc.}}$..
- B** Give one example for :
1. One use of electromagnet.
 2. A base.
 3. A sedimentary rock.
 4. Gas used by plants in photosynthesis process.
- C** Calculate the weight of an object, if the Earth's gravitational acceleration is 9.8 m/s^2 and its mass is 10 kg.

Question

A Choose the correct answer :

1. Earth locates in the solar system regarding its distance from the Sun in the _____ order.
a. fifth b. fourth c. third d. seventh
2. The measuring unit of force is _____.
a. kg. b. m/sec^2 . c. newton. d. coulomb.
3. There is a triple covalent bond in _____.
a. oxygen. b. nitrogen. c. water. d. sodium chloride.
4. Water bodies on Earth's surface form the percentage of _____.
a. 50% b. 71% c. 40% d. 30%

B Choose from column (B) what suits it in column (A) .

(A)	(B)
1. Atmospheric pressure on Earth's surface	a. is from metamorphic rocks.
2. ^{19}K	b. is monovalent.
3. Stopping the bicycle after using brakes	c. is about 76 cm.Hg.
4. Marble	d. is an acid.
	e. due to friction.

C Write the chemical formula of sodium chloride.

Question

A Write the scientific term :

1. Breaking the reactants bonds and forming new ones among the products
2. The ability of the Earth to attract an object to its centre.
3. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
4. The layer that protects living organisms from harmful ultraviolet rays (UV).

B Put (✓) in front of the right statement and (✗) in front of the wrong one :

1. The weight of object decreases with increasing of its mass. ()
2. The valency of noble gases is monovalent. ()
3. Air pressure on Earth's surface is suitable for continuity of life. ()
4. Quartz mineral is one of the main components in granite rock. ()

C Give a reason for : policemen advice driver to use safety belts in car.

Question

A Correct the underlined words :

1. Simple pendulum motion is a transitional motion.
2. Acid dissolves in water to produce negative hydroxide ion
3. Water molecule consists of four atoms for two elements.
4. Nitrogen gas represents 21% of air volume.



B Choose the odd word out :

1. ${}^2\text{He}$ – ${}^{10}\text{Ne}$ – ${}^{11}\text{Na}$ – ${}^{18}\text{Ar}$
2. Work – Weight – Mass – Earth's gravitational acceleration.
3. Quartz – Mica – Basalt – Feldspar.
4. Earth's crust – Atmosphere – Mantel – Core.

C Give one difference between acids and bases [according to their effect on litmus paper].

20 Luxor Governorate

Science Inspectorate

Answer the following questions :

Question 1

A Choose the correct answer :

1. The chemical bond in magnesium oxide molecule is
 a. double covalent. b. single covalent. c. ionic. d. triple covalent.
2. Electromagnet is used in making the set.
 a. electric bell b. microscope c. night vision d. calculator
3. Regarding the volume, the Earth occupies the order (ascendingly) in the solar system.
 a. third b. fourth c. first d. eighth
4. Green plants use gas in photosynthesis process.
 a. carbon dioxide b. nitrogen c. oxygen d. helium

B Correct the underlined words :

1. Salts are substances dissociated in water producing negative hydroxide ions
2. Motion is divided into two types which are circular motion and transitional motion.
3. Marble is resulted from transformation of sandstone.
4. Inner core is a layer of molten metals with a thickness 2100 km.

C Give a reason for : lubricating and oiling mechanical machines

Question 2

A Complete the following sentences :

1. The valency of aluminium ${}_{13}\text{Al}$ is while that of calcium ${}_{20}\text{Ca}$ is
2. Water waves is an example of waves, while light waves is an example of waves.
3. Granite rock consists of quartz, .. and ..
4. is the molten materials mass that spread on the sides.

B Put (✓) or (x) :

1. Mercury is the only nonmetal that exists in a liquid state. ()
2. Object's weight changes from one place to another on the Earth's surface. ()
3. Steadfastness of the hydrosphere on the Earth's surface is due to Earth's gravity. ()
4. The most abundant (available) gas in air is oxygen. ()

C Write the chemical formula of sodium carbonate.

Question 3

A Write the scientific term of each of the following :

1. An atom of a non-metallic element that gains one electron or more during the chemical reaction.
2. Elements contain less than 4 electrons in their outer most energy level.
3. Property of an object has to resist the change of its state unless an external force acted on it.
4. A layer that protects life on the Earth by absorbing ultraviolet rays

B Complete the following using the words below :

(2CO_2 – sensation - C_2O_2 – relaxation – inner core – mantle – atmosphere)

1. $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} \dots$
2. The contraction and . of muscles helps the body organs to move.
3. The Earth's is rich in iron and nickel.
- 4 is a white colour surrounds the planet Earth in a picture from the moon.

C What happens when the car at rest moves suddenly. (Relative to the passengers).

Question 4

A Choose from column (B) what suits it in column (A) .

(A)	(B)
1. Noble gas	a. compound dissolved in water producing positive hydrogen ions.
2. Acid	b. prevents feet from slipping on roads during walking
3. Friction	c. an atom that doesn't give or gain any electrons.
4. Magma	d. compound resulted from the combination between oxygen and an element.
	e. a molten material that exists at depths beneath the crust.

B Give one example of each following :

- | | |
|--------------------|-------------------------|
| 1. Insoluble salt. | 2. Transition motional. |
| 3. Volcanic rocks. | 4. Sedimentary rocks. |

C Write the name of the following compound and mention its type Na_3PO_4



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Part **1**

Guide Answers of The Main Book.

Pages (4 - 27)

Part **2**

Guide Answers of Worksheets.

Pages (29 - 40)

Part **3**

Guide Answers of Final Examinations.

Pages (42 - 51)

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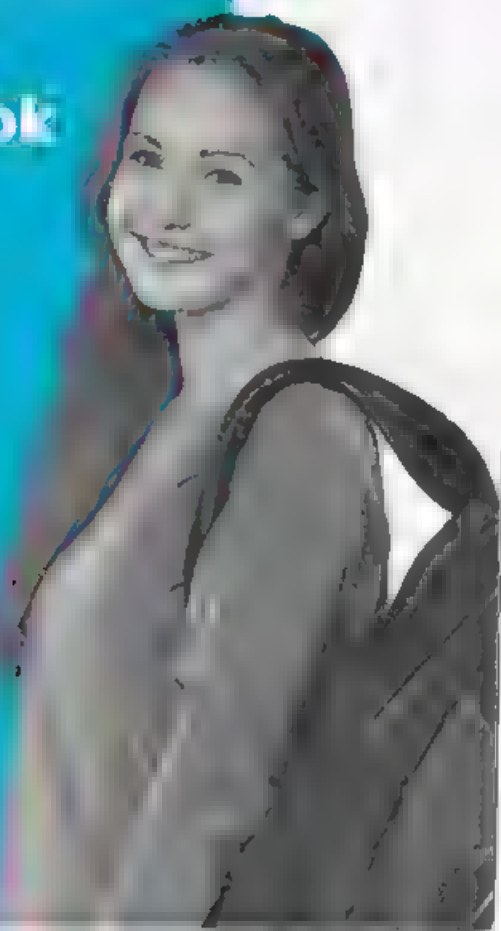


1

GUIDE

of

The Main Book



Unit One

1

- 1 b 2 c 3 d 4 b 5 d
6 a 7 b 8 b 9 c 10 a
11 c 12 J 13 c 14 a 15 c
16 a 17 c 18 c 19 c 20 c
21 a 22 c 23 b 24 b 25 b
26 c 27 d 28 b 29 c 30 c
31 b 32 b 33 d

- 2 (✓)
3 (x) into positive ions 4 (✓)
5 (x) is less than 6 (✓)
7 (x) has 8 electrons 8 (✓)
9 (x) monoatomic molecules
10 (x) Covalent bond
11 (x) is an ionic bond
12 (x) magnesium atom gives two electrons to oxygen atom.
13 (✓) 14. (✓)
15 (x) ... is a single covalent bond.
16 (✓) 17 (✓) 18. (✓)
19 (x) ... is a single covalent bond.

- 1 Metals. 2 Mercury
3 Nonmetals. 4 Bromine
5 Graphite (carbon). 6 Positive ion.
7 Negative ion. 8 Ion
9 Noble gas. 10. Noble gases
11 Ionic bond. 12 Ionic bond
13 Covalent bond. 14 Single covalent bond
15 Double covalent bond.
16 Triple covalent bond

- 1 18
2 metals nonmetals noble gases
3 four 4 solids - mercury
5 Metallic 6 metals - positive
7 Sodium - magnesium
8 loses - positive 9 two - eight.
10 more 11 nitrogen - carbon.
12 bad - graphite - good
13 metals nonmetals
14 metals nonmetals

- 15 Mercury - bromine 16 seven - ten
17 $(O^{2-}) - (Na^+)$
18 a nonmetallic a metallic
19 noble gas
20 Noble gases - electrons.
21 metallic nonmetallic
22 a positive ion - a negative ion
23 gains - negative
24 magnesium two - oxygen
25 Sodium chloride - magnesium oxide
26 nonmetallic 27 covalent
28 ionic - double covalent
29 ionic - single covalent
30 gains - shares with
31 single - double - triple
32 single covalent - triple covalent

3

(A)

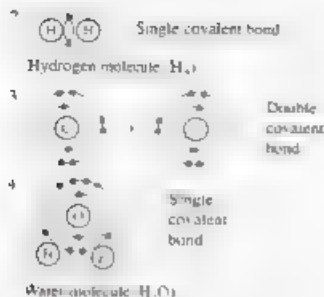
Element	Its electronic configuration	No. of protons	Its type	No. of electrons in atom	Type of ions	Symbol of its ion
1 $_{12}Mg$	2, 8, 2	12	Metal	10	Positive	Mg^{2+}
2 $_{15}P$	2, 8, 5	15	Nonmetal	18	Negative	P^{3-}
3 $_{18}Ar$	2, 8, 8	18	Inert gas	No ion	No ion	No ion
4 $_{17}Cl$	2, 8, 7	17	Nonmetal	18	Negative	Cl^{-}
5 $_{19}K$	2, 8, 8, 1	19	Metal	18	Positive	K^{+}

(B)

Atom	Electronic configuration	Molecular	Type of bond
1 $_{11}Na$	2, 8, 1	$NaCl$	Ionic
2 $_{12}Mg$	2, 8, 2	$MgCl_2$	Ionic
3 $_{7}N$	2, 5	N_2	Triple covalent
4 $_{8}O$	2, 6	O_2	Double covalent

4





- 1 Because the number of electrons in ion is less than or more than its number in the same atom by the number of lost or gained electrons.
- 2 Because the number of negative electrons becomes less than the number of positive protons.
- 3 Because the number of negative electrons becomes more than the number of positive protons.
- 4 Because the atom of a metallic element loses the electrons of the outermost energy level forming a positive ion.
- 5 Because sodium atom loses its outermost electron and changes into a positive ion, while oxygen atom gains two electrons to complete its outermost energy level and changes into a negative ion.
- 6 Due to the completeness of their outermost energy levels with electrons.
- 7 Because sodium ion is formed when sodium atom loses one electron and changes into (Na^+) which contains 10 electrons, while oxygen ion is formed when oxygen atom gains two electrons and changes into (O^{2-}) which contains 10 electrons too.
- 8 Because magnesium loses two electrons and changes into a positive ion while oxygen gains the two electrons (which are lost by magnesium) and changes into a negative ion, then electric attraction occurs between positive and negative ions.
- 9 Because each of them is a metal and their atoms tend to lose the electrons of the

outermost energy level during chemical reactions.

- 10 Because ionic bond arises between two different atoms (metal and nonmetal) as a result of the electric attraction between a positive ion of an atom of a metallic element and a negative ion of an atom of a (nonmetallic) element while covalent bond arises between two similar or different nonmetal atoms.
- 11 Because chlorine atom (nonmetal) gains the electron which is lost by sodium atom, so an electric attraction occurs between positive sodium ion and negative chloride ion, while each of the two chlorine atoms share with one electron to complete its outermost shell.
- 12 Because it arises by sharing each hydrogen atom with only one electron to complete its outermost shell with two electrons and becomes more stable.
- 13 Because it arises by sharing each oxygen atom with two electrons to complete its outermost shell with 8 electrons and becomes more stable.
- 14 Because oxygen atom shares each of the two hydrogen atoms with one electron.
- 15 Because it arises by sharing each nitrogen atom with three electrons to complete its outermost shell with 8 electrons and becomes more stable.

- 1 They are elements which contain 1 or 2 or 3 electrons in the outermost energy level.
- 2 They are elements which contain 4 or 5 or 6 electrons in the outermost energy level.
- 3 It is an atom of a metallic element which loses an electron or more during the chemical reaction.
- 4 It is an atom of a nonmetallic element which gains an electron or more during the chemical reaction.
- 5 It is the atom of an element which loses or gains an electron or more during the chemical reaction.
- 6 They are elements which don't participate in any chemical reaction in ordinary conditions due to the completeness of their outermost energy levels with electrons.

- It is a chemical bond resulted from the electric attraction between a positive ion and a negative ion.
- It is a chemical bond formed between the atoms of nonmetals through sharing of each atom with a number of electrons to complete the outer electron shell of each atom.
- It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with one electron.
- It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with two electrons.
- It is a chemical bond arises between two nonmetal atoms, where each atom shares the other atom with three electrons.

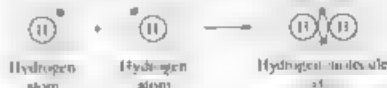
- It will be fragmented easily because carbon is from nonmetals which are not malleable.
- It changes into a positive ion carries a number of positive charges equals to the number of given electrons.
- It changes into a negative ion carries a number of negative charges equals to the number of gained electrons.
- Magnesium loses two electrons and changes into a positive ion and oxygen gains the two electrons (which are lost by magnesium) and changes into a negative ion, then electric attraction occurs between positive and negative ions to form a molecule of magnesium oxide.
- Each atom shares with one electron to become the outermost shell of each of them completed with electrons.
- Each oxygen atom shares with two electrons to complete its outermost shell with 8 electrons and becomes more stable.

(Odd word (or symbol))	Scientific name
Mercury	→ Solid metal
2. Al	→ Metals
3. Na	→ Elements that may carry negative charges
4. Graphite	→ Nonmetals are bad conductors of electricity
5. Sodium	→ Nonmetals
6. B	→ Nonmetals
7. Ne	→ Noble inert gases
8. Table salt molecule	→ Covalent molecules

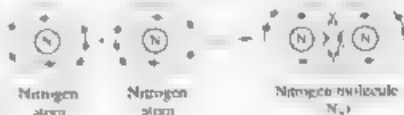
Element	Electronic configuration			1. Its type	2. The type of its ion
	K	L	M		
18 Ar	2	8	8	Noble gas	No ion
12 Mg	2	8	2	Metal	Positive (Mg^{2+})
16 S	2	8	6	Nonmetal	Negative (S^{2-})

Element	Electronic configuration				1. Its type	2. The type of its ion
	K	L	M	N		
1 H	1	-	-	-	Nonmetal	Negative
11 Na	2	8	1	-	Metal	Positive
7 N	2	5	-	-	Nonmetal	Negative
10 Ne	2	8	-	-	Noble gas	No ion
8 O	2	6	-	-	Nonmetal	Negative
17 Cl	2	8	7	-	Nonmetal	Negative
19 K	2	8	8	1	Metal	Positive

3. a. By sharing of each atom by one electron to form single covalent bond (H - H).



- b. By sharing of each atom by three electrons to form triple covalent bond ($N \equiv N$).



4. Neon (Ne)

- Look at the main book on page (15).
- Look at the main book on page (16).

POC	Mercury	Bromine
Type of element	Metal	Nonmetal
Physical state	Liquid	Liquid
Luster	It has a metallic luster	It has a metallic luster



P.O.C.	Aluminium	Graphite
Electric conduction	Good	Good
Heat conduction	Good	Bad
Ability to malleable and ductile	It is malleable and ductile	It is not malleable or ductile

5 Look at the main book on page (16).

6 Look at the main book on page (14).

Single covalent bond (s)	Double covalent bond (d)	Triple covalent bond (t)
It is a chemical bond which arises between two nonmetal atoms by sharing of one pair of electrons where each atom shares by one electron. Ex.: Hydrogen molecule (H ₂).	It is a chemical bond which arises between two nonmetal atoms by sharing of two pairs of electrons, where each atom shares by two electrons. Ex.: Oxygen molecule (O = O).	It is a chemical bond which arises between two nonmetal atoms by sharing of three pairs of electrons, where each atom shares by three electrons. Ex.: Nitrogen molecule (N ≡ N).

- 14
- Graphite : It is a good conductor of electricity.
 - Oxygen : It is a bad conductor of electricity.
 - (Na) : It is sodium atom that has neutral charge.
 - (Na⁺) : It is sodium ion that carries one positive charge.
 - Oxygen molecule (O₂) : There is a double covalent bond between the two oxygen atoms.
 - Two oxygen atoms (2O) : There isn't bond between the two atoms.

15 1 Look at the main book on page (9).

2 Look at the main book on page (12).

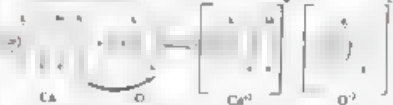
16 Because iron is a metallic element which is malleable so, it will be not broken, while coal is a nonmetal element which is not malleable so, it will be broken.



18 1 Look at the main book on page (22).

2 Look at the main book on page (20).

3 Ionic bond



4 & 5 Look at the main book on pages (20, 22 & 23).

Fig. a	1. Type of element & ion	2. No. of electrons which lost or gained
Fig. (a)	Nonmetal, Negative ion	Gains one electron
Fig. (b)	Nonmetal, Negative ion	Gains three electrons
Fig. (c)	Metal, Positive ion	loses two electrons
Fig. (d)	Inert gas, No ion	Zero
Fig. (e)	Metal, Positive ion	loses one electron

3 Fig. (c) and Fig. (e)

20 1 Fig. (b) 2 Fig. (a) 3 Fig. (e)

21 1 Look at the main book on page (20).

2 Ionic bond

Thinking Skills Questions

1 1. c 2. c 3. a 4. d 5. c 6. c

2 (S) & (P) 2. (P)

- 3 Negative ion, because it is a nonmetal that gains 3 electrons during the chemical reaction.
- 4 (S) because its atomic number = 2 + 8 + 1 = 11

3 1 Because they are malleable, ductile and they have metallic luster.

2 Because they are good conductors of heat.

4 1 Element (A) is a nonmetal.

Element (B) is a metal.

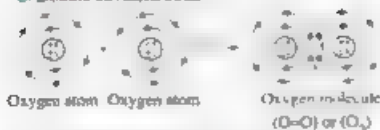
Element (C) is a noble gas.

Element (D) is a nonmetal.



- 3 Ionic bond.
- 4 Single covalent bond.
- 5 Because its outermost energy level is completely filled with 8 electrons.

- 1 Element (A) is a nonmetal.
Element (B) is a metal.
2 Double covalent bond



3 Look at the main book on page (20).

Electron configuration	Type of element	Atomic number
1 (H)	Nonmetal	1
2 (He)		2
3 (Li)	Metal	3
4 (Be)		4
5 (B)	Nonmetal	5
6 (C)		6
7 (N)	Nonmetal	7
8 (O)		8
9 (F)	Nonmetal	9
10 (Ne)		10
11 (Na)	Metal	11
12 (Mg)		12
13 (Al)	Metal	13
14 (Si)		14
15 (P)	Nonmetal	15
16 (S)		16
17 (Cl)	Nonmetal	17
18 (Ar)		18

2

1 c	2 h	3 e	4 h	5 a
6 h	7 a	8 a	9 i	0 a
15 a	12 p	13 d	14 b	5 e
6 a	17 j	18 e	9 d	20 e
25 e	22 h	23 a	24 e	25 e
26 h	17 e	28 h	29 d	40 e
3 b	12 e	33 a	34 d	35 h
36 d	17 d	38 b	39 d	40 b
41 e	42 e			

g	2 b	3 e	4 a
5 a	6 b	7 e	8 f

11 b C	2 a A	3 d D	4 a B
5 a B	2 e A	3 b C	

1 (✓)

2 (x) two positive charges

3 (x) three atoms

4 (x) is zero.

5 (x) is one atom ..

6 (✓) 7 (✓)

8 (x) is (CO₃)²⁻

9 (x) (Y) is monovalent and (X) is divalent

10 (x) is trivalent.

11 (✓) 12 (✓)

13 (✓)

14 (x) is Al₂(SO₄)₃

15 (x) (Na₂O) is 16 (✓)

17 (x) The valency of sodium in (NaCl) and (Na₂CO₃) is monovalent.

18 (x) two monovalent elements

19 (x) is Ca(OH)₂.

20 (x) of sulphuric acid is (H₂SO₄)

21 (x) is hexavalent

22 (x) Acids

23 (x) is blue

24 (x) except hydroxide group

25 (x) produces (ZnO) oxide ...

26 (✓) 27 (✓)

28 (x) form salts.

29 (x) a salt

30 (x) is water insoluble while sodium chloride is water soluble

1 Valency.

2 Inert (noble) gases

3 Atomic group.

4 Chemical formula

5 Acids.

6 Bases.

7 Oxides.

8 Metal oxides.

9 Nonmetal oxides.

10 Salt

1 monovalent divalent

2 trivalent divalent

3 iron copper

4 divalent trivalent

5 nitrogen sulphur phosphorus

6 divalent tetravalent hexavalent

7 trivalent pentavalent

8 zero completely fixed

9 monovalent divalent

0 Hydroxide nitrate carbonate sulphate

11 divalent monovalent

12 (PO₄)³⁻ trivalent

- 3 $(\text{SO}_3)^{2-}$ five two 14 oxygen
 15 (Na_2CO_3) six three
 16 trivalent divalent
 17 $\text{MgSO}_4 \cdot \text{Ca}(\text{NO}_3)_2$
 18 $\text{HCl} \cdot \text{NaOH}$ 19 $\text{H}_2\text{O} \cdot \text{H}_2\text{SO}_4$
 20 tetravalent
 21 divalent $\text{Ca}_3(\text{PO}_4)_2$
 22 sodium oxide MgCl_2
 23 monovalent monovalent
 24 acids oxides salts
 25 hydrogen hydroxide
 26 sour red bitter blue
 27 $\text{NaOH} \cdot \text{MgCl}_2$
 28 Sulphuric acid hydrochloric acid
 29 an acid - a base
 30 hydrogen hydroxide
 31 Sodium oxide carbon dioxide
 32 soluble insoluble

Compound	Chemical formula	No. of atoms in the molecule	No. of elements forming the molecule	Its type
1 Sodium carbonate	Na_2CO_3	6	3	Salt
2 Copper carbonate	CuCO_3	5	3	Salt
3 Sodium hydroxide	NaOH	3	3	Base
4 Ammonium sulphite	$(\text{NH}_4)_2\text{SO}_3$	17	5	Salt
5 Calcium oxide	CaO	2	2	Oxide
6 Magnesium nitrate	$\text{Mg}(\text{NO}_3)_2$	9	3	Salt
7 Copper nitrate	$\text{Cu}(\text{NO}_3)_2$	7	3	Salt
8 Aluminium hydroxide	$\text{Al}(\text{OH})_3$	7	3	Base
9 Calcium carbonate	CaCO_3	5	3	Salt
10 Sulphuric acid	H_2SO_4	7	3	Acid
11 Magnesium oxide	MgO	2	2	Oxide
12 Sodium phosphate	Na_3PO_4	8	3	Salt

- 1 Because during chemical reactions, potassium atom loses one electron while oxygen gains or shares with two electrons to complete their outermost shell.
- 2 Because during chemical reactions, sodium atom loses one electron while chlorine atom gains or shares with one electron to complete their outermost shell.
- 3 Because their outermost energy levels are completely filled with electrons, so they don't lose, gain or share with any electrons.
- 4 Because during chemical reactions, magnesium atom loses two electrons while aluminium atom loses three electrons.
- 5 Because oxygen is divalent, while sodium is monovalent.
- 6 Because sodium is monovalent, while carbonate is divalent group, so two atoms of sodium combine with one atom of carbonate group.
- 7 Because oxygen is divalent, while hydrogen is monovalent, so two atoms of hydrogen combine with one atom of oxygen.
- 8 Because acids change the colour of litmus paper into red, while bases change the colour of litmus paper into blue.
- 9 Because acids produce positive hydrogen ions H^+ which responsible for their properties while bases produce negative hydroxide ions (OH^-) which responsible for their properties.
- 10 Because sodium chloride is water soluble salt while silver chloride is water insoluble salt.
- 11 Because caustic soda contains negative hydroxide ion, while lead bromide is formed from combination of positive metal ion with negative nonmetal ion.

- 1 It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.
- 2 This means that magnesium loses two electrons during a chemical reaction and changes into Mg^{+2} .

- This means that iron atom loses three electrons forming positive ion.
- This means that this element during the chemical reaction its atom gains or shares with three electrons.
- It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction having its own valency and it can't exist solely.
- It is a formula that represents the number and the type of the atoms in a molecule.
- They are substances which dissociate in water producing positive hydrogen ions H^+ .
- They are substances which dissociate in water producing negative hydroxide ions $(OH)^-$.
- They are compounds resulted from the combination between oxygen and an element even though it is a metal or a nonmetal.
- They are compounds produced from the combination of oxygen with a metal.
- They are compounds produced from the combination of oxygen with a nonmetal.
- They are compounds resulted from the combination of a positive metal ion (or a positive atomic group) with a negative atomic group (or a negative nonmetal ion except oxygen).

11	Odd word or formula	The relation between the rest
1	A aluminium	Most are non-metallic elements
2	Oxygen	They are metals
3	Hydrogen	They have more than one valency
4	Potassium	Most are valent nonmetals elements
5	A aluminium	Most are metals
6	Ammonium	They are highly acidic groups
7	HCl	They are bases
8	Al_2O_3	They are nonmetal oxides
9	SO_2	They are metal oxides
10	Fe_2O_3	They are acids
11	$AgCl$	They are water-soluble salts

- 12 Sodium (Na) 13 Hydrogen (H)
 14 Oxygen (O) 15 Nitrogen (N)
 16 Argon (Ar) 17 Nitrate group (NO_3)

- Phosphate group (PO_4)³⁻
- Sulphate group (SO_4)²⁻
- Sodium hydroxide (NaOH)
- Hydrochloric acid (HCl)
- Aluminium oxide (Al_2O_3)
- Sulphuric acid (H_2SO_4)
- Silver chloride ($AgCl$)
- Sodium chloride (NaCl)
- Sodium hydroxide (NaOH)

- 12 1. Calcium sulphate (6 atoms)
 2. Lithium bicarbonate (6 atoms)
 3. Magnesium hydroxide (5 atoms)
 4. Sulphuric acid (7 atoms)
 5. Sodium phosphate (8 atoms)
 6. Potassium nitrate (5 atoms)
 7. Magnesium phosphate (13 atoms)
 8. Carbon dioxide (3 atoms)
 9. Aluminium sulphate (17 atoms)
 10. Sodium nitrate (5 atoms)
 11. Calcium hydroxide (5 atoms)
 12. Calcium phosphate (13 atoms)
 13. Calcium carbonate (5 atoms)
 14. Hydrochloric acid (2 atoms)

- 13 1. NaOH 2. NaHCO₃ 3. Na₂SO₄
 4. Cu(NO₃)₂ 5. MgCl₂ 6. HNO₃
 7. H₂SO₄ 8. Ca(OH)₂ 9. Ca(HCO₃)₂
 10. CaSO₄ 11. FeO 12. KCl
 13. CuSO₄ 14. Al₂O₃ 15. Ca(NO₃)₂
 16. AgNO₃ 17. AgCl 18. HCl
 19. NaCl 20. CaCl₂ 21. Al(OH)₃
 22. NH₄Cl 23. K₂SO₄ 24. Na₂CO₃
 25. Na₂CO₃ 26. K₂Cr₂O₇ 27. SO₂
 28. H₂O

- 14 1. Look at the main book on page (48)
 2. Look at the main book on page (49)

- 15 1. A base 2. A salt
 3. A metal oxide 4. An acid
 5. A nonmetal oxide 6. A salt
 7. An acid 8. A base
 9. A nonmetal oxide 10. A salt
 11. An acid 12. A salt



16 1. Look at the main book on page (50).

P.O.C	Carbonate group	Bicarbonate group
- Chemical formula	$(\text{CO}_3)^{2-}$	HCO_3^-
- Valency	Divalent	Monovalent
Number of atoms	4 atoms	3 atoms

P.O.A	Potassium sulphate	Lead sulphate
- Chemical formula	K_2SO_4	PbSO_4
Solubility in water	Soluble in water	Insoluble in water

4. Look at the main book on page (50)

17 Because there are acidic compounds dissolve in rain water while there are alkaline compounds dissolve in sea water

18 1. H_2SO_4 2. KOH 3. K_2SO_4

19 1. Hexavalent (Nonmetal oxide)
2. Tetravalent (Nonmetal oxide)
3. Divalent (Salt) 4. Divalent (Acid)

20 1. It is a metal because it contains one electron in its outermost energy level.
2. It is monovalent because during chemical reaction it loses one electron.
3. X (I) 4. X_2SO_4

21 1. Element (X) 2 8 1
Element (Y) 2 8 7
2. Element (X) is monovalent because during chemical reaction it loses one electron.
Element (Y) is monovalent because during chemical reaction, it gains or shares with one electron.
3. Ionic compound (Salt)

Element	Electronic configuration				Its type	Valency
	K	L	M	N		
$_{11}\text{X}$	2	8	1		Nonmetal	Monovalent
$_{13}\text{Y}$	2	8	3		Metal	Trivalent
$_{17}\text{Z}$	2	8	7		Nonmetal	Trivalent
$_{20}\text{Q}$	2	8	8	2	Metal	Divalent

2 a. Salt b. Metal oxide Y_2O_3
3. Ionic combination QX_2

22 1. Monovalent 2. Metal oxide

23 ① 1. Element (A) is trivalent because during chemical reaction, it loses three electrons.
Element (B) is divalent, because during chemical reaction, it gains or shares with two electrons.
2. Aluminium oxide (Al_2O_3)

② 1. (C) 2. (B) 3. (D) 4. (E) 5. (A)

③ 1. (1) $\text{Ca}(\text{NO}_3)_2$ (2) NaOH

(3) H_2SO_4 (4) AgCl

2. (1) A salt (2) A base

(3) An acid (4) A salt

3. In tube (2), the paper doesn't change

In tube (3), the paper changes into red.

4. The salt dissolves in water

5. Ionic bond

Thinking Skills Questions

1 1. a 2. d 3. b 4. b
5. c 6. c 7. d

2 divalent 4 2. $\text{M}(\text{NO}_3)_2$ 3. M_2PO_4

3 a. 12 b. 24 c. divalent
2. XO

4 1. 12 Divalent
2. Positive ion - It carries two positive charges
3. Ionic bond
4. (1) d (2) c

5 1. 13 - Trivalent 2. Ionic bond
3. Salt 4. $\text{X}(\text{OH})_3$

Lesson 3

1 1. e 2. b 3. e 4. d
5. e 6. d 7. d 8. c
9. c 10. d 11. b 12. c
13. a 14. d 15. c 16. c

2 1. 1 b 2. d 3. a 4. c
5. 1 d 2. a 3. b 4. c



3 1 (X) ... a white powder

2. (✓)

3. (✓)

4 X between metal and nonmetal

5 ✓

6 (✓)

7 X Carbon on side

8 (X) ... increases.

9 (X) Nitrogen oxides

10 (✓)

11 (✓)

12 (✓) 13 (X) lightning

1 Chemical reaction. 2 Chemical equation.

3 Law of conservation of matter

4 Law of constant ratios

5 Direct combination reactions

6 Ammonium chloride 7 Carbon dioxide

8 Sulphur oxides. 9 Nitrogen oxides

1 breaking - forming

2 (a) double covalent - two oxygen atoms

(b) oxygen - magnesium oxide

3 symbols chemical formulae - products

4 balanced - conservation of matter

5 SO magnesium oxide

6 constant ratios

7 carbon dioxide - direct combination

8 white - ammonium chloride

9 medicines fertilizers plastics

10 Carbon oxides sulphur oxides - Nitrogen oxides

1 carbon dioxide

2 headache stomach aches fainting

3 sulphur dioxide sulphur trioxide corrosion

4 carbon monoxide carbon dioxide

5 air lung cancer

6 Nitrogen sulphur

7 Nitrogen acids

1 $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$

Direct combination between a metal and a nonmetal

2 $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$

Direct combination between two nonmetals.

3 $\text{NH}_3 + \text{HCl} \xrightarrow{\text{conc.}} \text{NH}_4\text{Cl}$

(Direct combination between two compounds)

4 $\text{XCO} + \text{O}_2 \xrightarrow{\Delta} 2\text{CO}_2$

Direct combination between an element and a compound

5 $2\text{XCl}_2 + \text{O}_2 \xrightarrow{\Delta} 2\text{XCl}_2\text{O}$

Direct combination between an element and a compound

1 Due to the formation of magnesium oxide (white powder) as a result of combination of oxygen with magnesium

2 To achieve the law of conservation of matter mass,

3 Because it combines with oxygen forming magnesium oxide $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$

4 Due to the formation of ammonium chloride as white clouds. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{conc.}} \text{NH}_4\text{Cl}$

5 Because through which, it is possible to obtain electric and heat energies used in some industries.

Obtain most useful substances from less used substances.

Prepare thousands of compounds are commonly used in many industries such as manufacture of medicines, fertilizers, fuel plastics, car batteries and food industries

6 Because some of them play a vital role in our life while others have negative effects on both human beings and environment.

7 Because it produces a lot of harmful gases that affect on humans and environment such as carbon oxides, sulphur oxides and nitrogen oxides

8 Because it prevents the penetration of thermal rays that reemitted back from the Earth to outer space

9 Because it causes lung cancer

10 Because its burning causes air pollution with poisonous substances that infect humans with lung cancer

11 Because it causes air pollution and lung cancer

12 Because it causes headache, fainting, severe stomach-aches and may lead to death

13 Because they are acidic gases

14 Because they are poisonous acidic gases.

1 $2\text{Al} + 3\text{Cl}_2 \longrightarrow 2\text{AlCl}_3$

2 $2\text{H}_2 + 2\text{NO} \longrightarrow 2\text{H}_2\text{O} + \text{N}_2$

3 $2\text{Na} + \text{Cl}_2 \longrightarrow 2\text{NaCl}$

4 $2\text{KI} + \text{Cl}_2 \longrightarrow 2\text{KCl} + \text{I}_2$

5 $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} 2\text{CO}_2$

- Q 1** It is the breaking of the existing bonds between the atoms of the molecules in reactants and forming new bonds between the atoms of the molecules in the products.
- 2** It is a set of symbols and chemical formulae representing the reactants and the products molecules in the chemical reaction and it represents the conditions of the reaction as well.
- 3** It is an equation in which the number of atoms entering a reaction equals the number of atoms resulting from this reaction.
- 4** The sum of reactants masses in any chemical reaction equals the sum of products masses.
- 5** The chemical compound is formed from combination of its elements by constant weight ratios.
- 6** They are the reactions which involve a combination of two or more substances to form a new compound.

Q 1 The produced substances from burning of coal and cellulose fibres

2. Carbon monoxide 3. Sulphur oxides.
4. Nitrogen oxides



(Direct combination between two elements a metal and a nonmetal).



(Direct combination between two nonmetals)



(Direct combination between two compounds)



(Direct combination between an element and a compound)

Q 1 A white powder i.e. magnesium oxide is formed.



2. White clouds of ammonium chloride are formed



3. Carbon dioxide compound is formed.



4. The temperature of air increases as (CO_2) causes the greenhouse effect

5. It causes air pollution and lung cancer

Q 1 Look at the main book on pages (80 & 81)

Q 1 Answer by yourself.

Q 1 Look at the main book on page (80 & 81).

② - Mass of reactants = $12 + (2 \times 16) = 44 \text{ gm}$

- Mass of products = $12 + (2 \times 16) = 44 \text{ gm}$

③ (1) Mass of reactants = $1 + 35.5 + 23 + 16 + 1$
= 76.5 gm

Mass of products = $23 + 35.5 + (2 \times 1) + 16$
= 76.5 gm.

(2) Mass of reactants = $32 + (2 \times 16) = 64 \text{ gm.}$

Mass of products = $32 + (2 \times 16) = 64 \text{ gm.}$



• The sum of reactants masses
= $12 + 32 = 44 \text{ gm}$

• The sum of products masses
= $12 + 32 = 44 \text{ gm.}$

• The sum of reactants masses =
The sum of products masses which
achieves the law of conservation of
matter

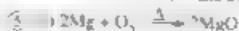
Law of conservation of matter The sum of
reactants masses in any chemical reaction
equals the sum of products masses

(2) Look at the main book on page (81).

(3) a. Nonmetal oxide

b. Covalent bond.

c. Direct combination reaction (between two
elements a metal and a nonmetal).



⑥ Look at the main book on pages (79, 80 & 81).

⑦ According to the law of conservation of matter

The mass of [Calcium hydroxide + Nitric acid]
= The mass of [Calcium nitrate + Water]

The mass of calcium nitrate = The mass of
[Calcium hydroxide + Nitric acid] The
mass of water

= $[74 + 126] - 36$

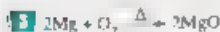
= 200 - 36

= 164 gm

Thinking Skills Questions

1 a 2 c 3 a

- 2 1 Because they are affected by acidic sulphur oxides produced from fuel burning
 2 To prevent corrosion of monuments by acidic sulphur oxides produced from fuel burning
 3 Due to increase the ratio of carbon monoxide in air from the burning of the fuel of car

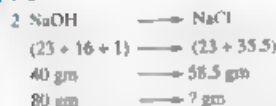


$$48 \text{ gm} \longrightarrow 80 \text{ gm}$$

$$9 \text{ gm} \longrightarrow 15 \text{ gm}$$

$$\text{Mass of magnesium reactant} = \frac{9}{80} \times 48 = 5.4 \text{ gm}$$

1 a



∴ Mass of produced sodium chloride

$$= \frac{58.5}{40} \times 80 = 117 \text{ gm}$$

- 2 a • Fig. (1) Direct combination reaction between a metal element with a nonmetal element



- Fig. (2) : Direct combination reaction between two nonmetal elements



- b • Fig. (1) : Metal oxide
 • Fig. (2) : Nonmetal oxide

Properties of magnesium ribbon	Properties of coal
It has metallic luster	It is not lustrous
It is malleable and ductile	It is not malleable and ductile

- 2 a White clouds are formed at the mouth of the tube
 b Direct combination between a compound with another compound



c - Ammonium chloride Salt

Unit Two

Lesson 1

- 1 1 b 2 d 3 d 4 b
 5 b 6 b 7 b 8 b
 9 b 10 c 11 c 12 d
 13 c 14 c 15 c 16 b
 17 b 18 c 19 b 20 c
 21 c 22 c 23 b 24 b
 25 d 26 c

- 2 1 ✓ 2 ✓ 3 ✗ into three main kinds
 4 ✗ Weight is
 5 ✗ increases by
 6 ✓
 7 ✗ ... decreases
 8 ✗ The scientist Newton ...
 9 ✓
 10 ✗ is equal to
 11 ✓ 12 ✓
 13 ✗ = (its mass × gravitational acceleration)
 14 ✗ is more than
 15 ✓ 16 ✓
 17 ✗ ... of wrought iron
 18 ✗ ... changes the mechanical (kinetic) energy into electric energy
 19 ✗ Electric motor
 20 ✗ ... in generating electric energy
 21 ✗ ... is producing electricity

- 3 1 Force 2 Object's weight
 3 Centre of gravity
 4 Newton 5 Object's weight
 6 Electromagnet
 7 Electric generator (Dynamo)
 8 Electric motor 9 Weak nuclear forces

- 4 1 force 2 force motion
 3 direction 4 motion - direction
 5 gravitational electromagnetic nuclear
 6 increases
 7 centre - weight
 8 weight - centre of gravity



- 9 its weight its mass
- 10 Object's mass Earth's gravitational acceleration
- 11 kilogram newton
- 12 mass changes
- 13 Object's mass, 14 newton
- 15 decreases, 16 30 newton
- 17 copper wrought iron
- 18 electric magnetic
- 19 electric winches electric bells
- 20 mechanical electric
- 21 electric mechanical
- 22 nuclear
- 23 medicine scientific researcher
- 24 electric energy military
- 25 strong nuclear

- 5
 - 1 Because there is no force acts on it
 - 2 Because the object changes its state when a proper force acts on it
 - 3 Because the force acting on the wall is improper
 - 4 Because the mass of the object is the amount of matter that the object contains, and it doesn't change by changing the position
 - 5 Because the amount of 1 kg represents the mass of a bag of sugar and not its weight
 - 6 Because the weight equals multiplying the mass of the object by Earth's gravitational acceleration
 - 7 Because Earth's gravitational acceleration changes from one place to another
 - 8 Because the distance between the Earth's surface and the centre of the Earth changes from one place to another due to the non-spherical shape of the Earth
 - 9 Because the Earth's gravitational acceleration at the south pole is greater than the Earth's gravitational acceleration at the equator
 - 10 Because it is changed into a temporary magnet
 - 11 Because it is used in generating of electric energy from mechanical energy
 - 12 Because it changes electric energy into mechanical energy
 - 13 Because it is used in medicine industry and producing electricity

- 6
 - 1 It is an effect attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.

- 2 It is the ability of the Earth to attract that object to its centre
- 3 This means that the amount of Earth's gravitational to this object is 60 newton
- 4 This means that the Earth's gravitational acceleration in this region is 9.8 m/sec^2

- 7
 - 1 Gravitational forces.
 - 2 Electromagnetic force
 - 3 Electromagnetic force
 - 4 Weak nuclear forces
 - 5 Strong nuclear forces
- 8
 - 1 It changes the electric energy into magnetic energy
 - 2 It changes the mechanical (kinetic) energy into electric energy
 - 3 It changes the electric energy into mechanical (kinetic) energy
- 9
 - 1 It is used in making of electric bells and electric winches
 - 2 They are used to lift scrap iron and cars in ports
 - 3 It converts the electric energy into mechanical energy
 - 4 It is used to get radioactive elements and radiations used in medicine
 - 5 It is used in producing electricity

- 10
 - 1 It will move, because there is a force acting on it
 - 2 It will change its direction, because the force acting on it can change the ball direction
 - 3 It doesn't move, because the force acting on it is improper
 - 4 The object's weight increases, because object's weight = object's mass \times Earth's gravitational acceleration and there is a direct relation between them
 - 5 The mass of the bird remains fixed, while the weight of the bird decreases, because the value of Earth's gravitational acceleration at the equator is less than that at the south pole
 - 6 The Earth's gravitational acceleration increases because Earth's gravitational acceleration increases by approaching to the Earth's centre
 - 7 The weight of the object decreases, while its mass remains constant because the mass doesn't change from a place to another, while the weight changes by changing the gravity

8. The mass of the astronaut remains constant while his weight is changed, because the mass doesn't change from a place to another, while the weight changes by changing the gravity
9. The iron bar will attract the iron filings, because the iron bar is changed into a temporary magnet.
10. Falling the pieces of iron, because the electromagnet loses its magnetic force

Odd word	Scientific name of the row
1. Ion forces	fundamental forces of nature
2. Work	Weight = Mass \times Force of gravitational acceleration
3. Sundell	Applications on electromagnetic forces

Mass	Weight
It is the amount of matter that the body contains	It is the force of Earth's gravitational attraction on the object
It is a fixed value	It changes from place to another on the Earth's surface
Its measuring unit is kg	Its measuring unit is newton
Mass = Weight Earth's gravitational acceleration	Weight = Mass \times Earth's gravitational acceleration

Electric generator	Electric motor
It changes mechanical energy into electric energy	It changes electric energy into mechanical energy

Strong nuclear forces	Weak nuclear forces
They are used in producing electricity and in military purposes	They are used in medicine, scientific researches and industries

- 12** The weight of the object
 $= \text{Object's mass} \times \text{Earth's gravitational acceleration}$
- a. The weight of the ball
 $= 0.3 \times 9.8 = 2.94 \text{ newton}$
- b. The weight of the boy
 $= 50 \times 9.8 = 490 \text{ newton}$

$$2. \text{ Mass} = \frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$$

$$= \frac{980}{9.8} = 100 \text{ kg}$$

3. a. Object's weight is equal to the Earth's gravitational force to this object
 $= 34.3 \text{ newton}$

b. Object's mass

$$= \frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$$

$$= \frac{34.3}{9.8} = 3.5 \text{ kg}$$

4. Object's mass = $\frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$

$$= \frac{80}{1} = 8 \text{ kg}$$

Gravitational acceleration on Mars = $\frac{\text{Weight}}{\text{Mass}} = \frac{32}{8}$
 $= 4 \text{ m/sec}^2$

- 13** • Lightning and thunder • Wind motion
 • The gravitational force of objects to Earth

2. • Gravitational forces
 • Electromagnetic forces • Nuclear forces

3. • Object's mass
 • Earth's gravitational acceleration

4. Weight = Mass \times Earth's gravitational acceleration

5. (1) The mass of the object at the south pole is equal to its mass at the equator

- (2) The value of Earth's gravitational acceleration at the equator is less than that its value at the south pole.

6. • The electromagnet is made up of an isolated copper wire coiled around a bar of wrought iron
 • It is used in making of electric switches and electric bells

7. Electromagnet.

8. • Weak nuclear forces are used in medicine, scientific researches and industry
 • Strong nuclear forces are used in producing electricity and in military purposes

9. The iron nail is changed into a temporary magnet due to flowing of an electric current through the wire

Input energy	Output energy
1. Thermal energy	1. Mechanical energy
2. Mechanical energy	2. Electric energy



- ⑪ (1) Due to the change of the value of Earth's gravitational acceleration.
 (2) The weight increases, because the value of the Earth's gravitational acceleration at the north pole [point (B)] is more than its value at the equator [point (A)].

Thinking Skills Questions

1. 1. c 2. c
2. The mass of object (B) = $\frac{400}{10} = 40$ kg
 • The mass of object (A) is doubled the mass of object (B)
 • The mass of object (A) = $2 \times 40 = 80$ kg.
3. Gravitational acceleration = $\frac{\text{Weight}}{\text{Mass}}$
 • The mass of the object doesn't change from a place to another
 • Gravitational acceleration on Moon's surface
 Gravitational acceleration on Earth's surface
 = $\frac{\text{Object's weight on Moon's surface}}{\text{Object's weight on Earth's surface}} = \frac{6}{30} = \frac{1}{5}$
- (1) The object's weight on Earth's surface
 = $30 \times 9.8 = 294$ newton.
 (2) The object's weight on Moon's surface
 = $30 \times \left(\frac{1}{5} \times 9.8\right) = 59$ newton.
4. Gravitational acceleration on the surface of Uranus planet = $\frac{300}{26} = 7.7 \text{ m/sec}^2$
5. • The weight of the rocket before shooting
 = $100 \times 10 = 1000$ N
 • The weight of the rocket after shooting
 = $\left(\frac{3}{4} \times 100 \times 10\right) = 750$ N.
 • The weight of the rocket before shooting is more than its weight after shooting.

Lesson 2

1. 1. b 2. c 3. a 4. b 5. a
 6. c 7. d 8. e 9. c 10. b
 11. b 12. e 13. a 14. c 15. c
 16. d 17. d 18. d 19. a 20. b
 21. c 22. b

2. 1. d 2. b 3. a

3. 1. ✗ is 50 km/hour
 2. ✗ rushed forward

3. (✗) Inertia
 4. (✗) — on stopping the forces of inertia
 5. (✗) — due to friction
 6. (✓) 7. (✓)
 8. (✗) — loss of mechanical energy —
 9. (✗) — very coarse substance —
 10. (✗) — decrease friction
 11. (✓) 12. (✓) 13. (✓)
 14. (✓) 15. (✓) 16. (✓)
 17. (✗) from the lower concentration to the higher one

4. 1. Inertia. 2. Safety belt.
 3. Friction forces. 4. Friction forces.
 5. Forces inside living systems (Biological forces).
5. 1. Force of inertia friction forces
 2. rushed forward inertia 3. rushed back
 4. rushed forward fall down
 5. speed inertia
 6. safety belts inertia 7. Friction
 8. Friction — walking 9. mechanical heat
 10. friction erosion
 11. Preventing feet from slipping on roads during walking helping in stopping and starting car motion
 12. simple complex
 13. contraction — relaxation
 14. lower higher 15. relaxation move

6. Due to inertia, as they try to maintain their state of motion.
 2. Due to inertia, as they try to maintain their state of rest.
 3. Due to inertia, as he tries to maintain his state of motion.
 4. Because safety belts work on stopping the forces of inertia to prevent the driver and passengers from being injured when a sudden change in motion occurs.
 5. Due to inertia, as its arms try to maintain its state of motion.
 6. Because the friction between the tyre of the bicycle and the brakes generates a friction force against motion of the bicycle which leads to resist it.
 7. To increase friction to control the motion.
 8. Because some mechanical energy is changed into heat energy due to friction.

- 9 Because friction with grass is more than friction with ice, so the motion is more controlled.
- 10 To increase friction between tyres and the road to help car in starting and stopping motion
- 11 To decrease friction between moving parts of machines and prevent their erosion
- 12 Because friction forces generate heat energy that leads to ignition of match
- 13 Because the oil stains decrease the friction forces, so the driver can't control the vehicle
- 14 Because friction forces have benefits as they help in stopping and starting cars motion, and also they have harms as they cause the erosion of machines parts and damage them as well.
- 15 Due to heart muscle contraction and relaxation.
- 7** 1 It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it.
- 2 It is a resistant force (against motion) originated between the object in motion and the medium touching it.
- 3 They are forces that enable living organisms to do their different biological operations.
- 8** 1. Forces of inertia.
2. Friction forces.
3. Forces inside living systems
4. Forces inside living systems
- 9** 1 The driver and the passengers will be rushed forward
- 2 The driver and the passengers will be rushed backward
- 3 The coin will fall in the cup
- 4 The passengers may be injured
- 5 The bike slows down due to the friction force between the brakes and the tyres of the bike
- 6 Parts of machines getting hot and erosion occurs.
- 7 Their temperature will increase
- 8 Movement of all body organs
- 9 Stopping the pulse
- 10** 1 Look at the main book on page (114)
- 2 Look at the main book on page (115).
- 3 Look at the main book on page (118).
- 4 Answer by yourself

- 5 • When the land is wet, the friction between my shoes and ground is small and this causes slipping of feet on roads
- When the land is dry, the friction increases and this prevents feet from slipping on roads during walking
- 6 Look at the main book on page (119).
- 7 Because the force of inertia makes the coin resists the sudden movement of the paper to maintain the state of rest
- We conclude that the force of inertia makes objects resist the change of their state unless an external force acted on them
- 8 (1) Adel's car
- (2) Due to the friction forces
- (3) It will move more slowly on the plane covered with sand because friction will increase

Thinking Skills Questions

- 1** 1. a 2. c
- 2** 1 Because friction force between the boat and the sand is more than friction force between the boat and water
- 2 Due to friction force between the outer surface of the spaceship body and the air of the atmosphere
- 3 To absorb the heat energy produced due to friction even the tire of lathe worked doesn't expand
- 3** 1 a
- 2 • Solution (A) , its concentration 40 %
• Solution (B) , its concentration 10 %
Because liquids transport from lower concentration to higher one
- 3 The intestine is shrinking because the liquid transports from the intestine to the solution
- 4 Forces inside living systems.
- 4** (c)

Lesson 3

- 1** 1. c 2. a 3. c 4. b 5. b
6. a 7. b 8. c 9. d 10. b



- 11 d 12 a 13 c 14 a 15 a
16 c 17 d 18 b 19 b 20 b
21 a 22 c 23 d 24 b 25 a
26 d 27 c 28 a 29 d

- 2 b 3 a 4 d 5 c

- 3 1 (X) backward 2 (✓)
3 (X) a transitional motion
4 (✓)
5 (X) periodic motion and transitional motion
6 (X) Transitional motion is
7 (X) - a vibrating motion.
8 (✓) 9 (✓) 10 (✓)
11 (X) mechanical waves
12 (✓)
13 (X) by electromagnetic forces.
14 (X) Ultrasonic waves
15 (X) - as flute and reed pipe
16 (X) Infrared rays
17 (X) Infrared rays
18 (X) Ultraviolet rays
19 (X) X rays are
20 (✓) 21 (✓)
22 (X) We use visible light in

- 4 1 Speed 2 Relative motion
3 The reference point. 4. Transitional motion
5 Periodic motion
6 Vibrating motion. 7 Circular motion
8 Wave motion. 9. Mechanical waves
10 Mechanical waves
11 Electromagnetic waves
12 Electromagnetic waves
13 Infrared rays.

- 5 1 position - direction - frame of reference.
2 stop
3 backward
4 transitional periodic
5 position initial final
6 periodic transitional
7 initial - final repeat
8 Periodic - equal
9 Circular vibrating wave motions
10 vibrating wave periodic
11 mechanical electromagnetic

- 12 water mechanical
13 free space - medium
14 vibration - particles
15 medium free space.
16 mechanical electromagnetic
17 electromagnetic
18 Ultraviolet infrared
19 Radio waves - X-rays gamma rays
20 mechanical electromagnetic
21 less
22 free space 300 millions
23 stored fluid pneumatics
24 infrared visible light
25 Ultraviolet gamma
26 Infrared heat
27 Photographing bones - examining mineral raws
28 photography light shows
29 Infrared

- 6 1 Because the trees and buildings appear moving by the same speed of the car but in the opposite direction.
2 Because the train position is changed relative to a fixed point from time to time between initial and final positions.
3 Because it is a motion which is regularly repeated in equal periods of time
4 Because transitional motion has initial and final points and it doesn't repeat its motion.
5 Because the sunlight is electromagnetic waves which can travel through free space, while the sound of solar explosions is mechanical waves which can't travel through free space
6 Because sound is mechanical waves which can't travel through free space
7 Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves
8 Because sound is from mechanical waves, while light is from electromagnetic waves
9 Because they need a medium to transfer through
10 Because remote sets work by infrared rays (electromagnetic waves) which can travel through space
11 Because they have heat effect property.

- 12 Because they detect the bone fractures.
- 13 To show errors, pores and cracks in these minerals
- 14 Because they are used to treat and discover some swellings (tumors)
- 15 To be sterilized before reuse

- 1** 1 It is the distance covered by an object in a unit time.
 2 It is the change in an object's position or direction as the time passes relative to another object or a fixed point known as frame of reference.
 3 They are waves that need a medium to transfer through.
 4 They are waves accompanied by electromagnetic forces and they don't need a medium to travel through.
 5 It is a motion which is regularly repeated in equal periods of time.
 6 It is the motion in which the object's position is changed relative to a fixed point from time to time between initial and final positions.

- 2** Both of them seem to be at rest to each other.
 2 You will imagine that your car moves forward.
 3 You will imagine that your car moves backward.

- 3** 1 A car moves relative to a tree.
 2 The motion of a bicycle or a car or a train.
 3 The vibration of a pendulum.
 4 The movement of the Moon around the Earth.
 5 Water waves.
 6 Sound waves or water waves.
 7 Visible light.
 8 Infrared or ultraviolet rays.
 9 Lute or guitar. 10. Flute or reed pipe.
 11 Infrared rays.

- 10** 1 A simple pendulum motion.
 All are transitional motion except this is a periodic motion.
 2 The movement of a piece of cork on the surface of shaking water.
 All others are examples of circular motion.
 3 Transitional motion.
 All others are periodic motion.

- 4 Water waves.
 All are electromagnetic waves except water waves which are mechanical waves.
 5 Light waves.
 All are mechanical waves except light waves which are electromagnetic waves.

- 11** 1 Gamma rays or X rays. 2 1. Electromagnetic waves.
 3 Infrared rays. 4 Infrared rays.
 5 Infrared rays. 6 Ultraviolet rays.
 7 X rays. 8 X rays.
 9 Gamma rays. 10. Visible light.
 11 Visible light.

- 12** 1 Examining and curing sets for human body.
 2 Cooking food.
 3 Sterilizing the sets of surgical operations rooms.
 4 Photographing bones.
 5 In medical purposes, as the treatment and discovering of some swellings.
 6 In photographic cameras.

- 13** 1 Look at the main book on page (131).
 2 Look at the main book on page (132).

Train motion	Fan arms motion
A translational motion	A circular periodic motion
Simple pendulum motion	Water waves motion
A vibrating periodic motion	A wave periodic motion

- 14** 1 • Motion of a bicycle • Motion of a car
 • Motion of a train
 2 • Motion of vibrating pendulum
 • Movement of the Moon around the Earth
 • Motion of water waves
 3 Mechanical waves
 • Sound waves • Water waves
 Electromagnetic waves
 • Visible light • Gamma rays
 4 Infrared rays X rays Visible light

- 15** 1 - (5) & (7) Circular periodic motion
 - (2), (4) & (8) Transitional motion
 - (3) & (9) Vibrating periodic motion
 - (6) Wave periodic motion



Thinking Skills Questions

- 1 a Translational motion, because it has initial and final points.
b Periodic motion, because it repeats its motion in equal periods of time.
- 2 Because the speed of radio waves (electromagnetic waves) is greater than the speed of sound waves (mechanical waves).
- 3 1 The car seems to be static.
2 The motor car seems to be moving at the same speed, but in the opposite direction.
3 The other car seems to be moving at a high speed.
4 The train moves a translational motion.
5 The sunflower plant moves in a periodic motion.

Unit Three

Lesson 1

- 1 a 2 c 3 b 4 c 5 c
6 d 7 b 8 b 9 c 10 d
11 b 12 c 13 b 14 b 15 a
16 b 17 a 18 c 19 c 20 d
21 a 22 a 23 b 24 b 25 b
26 d 27 c 28 d 29 b 30 b
31 d 32 c 33 b 34 b 35 a
36 b 37 c 38 b 39 d 40 d
41 b 42 b

- 2 (A) ① 1. b 2. a 3. d 4. c
② 1. e 2. f 3. b 4. g
5. a 6. a
- (B) 1. b - A 2. a - D 3. c - B 4. d - C

- 3 (✓) 2 (✓)
3 (✗) ... spiral arms
4 (✗) ... telescopes
5 (✗) ... our star
6 (✗) ... spherical opaque ...
7 (✓) 8 (✗) ... and Mars
9 (✗) ... between 3.3 to 5.5 g/cm³
10 (✓) 11 (✓) 12 (✓) 13 (✓)
14 (✗) ... the second

- 15 (✓) 16 (✗) The inner planets
17 (✓) 18 (✗) ... is 1100 m/sec²
19 (✓) 20 (✗) ... on Jupiter
21 (✗) ... and Mars
22 (✗) Meteors ...
23 (✗) ... in elongated elliptical orbits
24 (✗) Comets ...
25 (✗) ... 76 years 26 (✓)

- 4 1 Celestial body. 2 Stars
3 Light year. 4 Galaxy
5 Milky Way galaxy. 6 Planets
7 The Sun. 8 Inner planets
9 Outer (giant) planets. 10 Mercury
11 Mercury and Venus 12 Earth
13 Jupiter. 14 Mars
15 Moons. 16 Asteroids
17 Asteroids belt. 18 Meteors.
19 Meteorites. 20 Comets.
21 Halley's comet.

- 5 1 celestial body 2 Stars 3 light year
4 Milky Way - Chopped Hay
5 reflecting - refracting
6 celestial bodies 7 Sun
8 the Sun planets - asteroids meteorites
9 eight
10 elliptical (oval) - perpendicular
11 inner - outer
12 Mercury - Venus Mars - Uranus
13 Mercury - Neptune 14 Jupiter Earth.
15 Venus - Mars - Uranus
16 small - giant 17 Venus - Earth
18 Mercury Venus 19 Mercury
20 hydrogen - helium
21 mass of each object - distance between them
22 Jupiter - mass 23 Uranus - Neptune
24 62 - 2 25 Earth.
26 rocky masses - Sun 27 Mars - Jupiter
28 meteor - meteorites. 29 head - tail
30 nitrogen - methane
31 most elongated elliptical
32 Halley 76

- 6 1 Because they are far from us
2 Because these distances are too huge to be measured by kilometres
3 Due to the attraction force of the Sun to the planets.

- 4 Because they are the nearest four planets to the Sun.
- 5 Because they consist of solid rocky bodies.
- 6 Because they are the furthest four planets from the Sun.
- 7 Because they consist mainly of gaseous bodies.
- 8 Due to the high pressure and extreme coldness on the surfaces of these planets.
- 9 Because the mass of the Earth planet is larger than that of Mars planet and the force of gravity is directly proportional to the mass.
- 10 Due to the difference in the gravity acceleration from a planet to another.
- 11 Because they rotate around the planets and they are affected by their gravity.
- 12 Due to the burning of small rocky masses when they penetrate the Earth's atmosphere as a result of heat produced from their friction with air forming meteors.
- 13 Because it completes its revolution around the Sun every 76 years.

7

Odd word	Scientific note
1 Mercury	Inner planets surrounded by an atmosphere
2 The Sun	Planets
3 Saturn	Inner planets
4 Venus	Outer planets
5 Halley	Planets
6 Earthquakes	Celestial bodies

8

1. Light year.
2. Number of planets in the solar system.
3. Number of inner or outer planets.
4. The range of densities of inner planets.
5. The range of densities of outer planets.
6. Number of moons rotating around Saturn planet.
7. The moon which rotates around the Earth.
8. Number of moons of inner planets group.
9. Number of moons rotating around Uranus planet.
10. Number of moons rotating around Jupiter planet.
11. Acceleration due to gravity on the Earth.
12. Acceleration due to gravity on Jupiter.
13. The mass of the biggest meteorite.

14. The time of revolution of Halley's comet around the Sun.

9

- 1 Any body swims in the space such as stars, planets, moons and rocky or gaseous bodies.
- 2 They are big-sized bodies that emit enormous amounts of heat and light.
- 3 It is the distance covered by light in one year and it equals 9.467×10^{12} km.
- 4 This means that the distance between two stars $= 2 \times 9.467 \times 10^{12} = 18.934 \times 10^{12}$ km.
- 5 They are the greatest units that form the universe.
- 6 They are eight spherical opaque bodies revolve around the Sun in elliptical paths.
- 7 They are four small rocky planets nearest to the Sun.
- 8 They are four giant gaseous planets farthest from the Sun.
- 9 They are followers that are affected by the gravity of the planets that rotate around them.
- 10 They are rocky space bodies of different sizes, most of them rotate in the region of the belt of the wanderer asteroids.
- 11 It is a region that separates the group of the inner planets from the group of the outer planets.
- 12 They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.
- 13 They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface.
- 14 They are masses of rocks, ice and solidified gases that revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.

10

1. Stars will be seen as light small points.
2. We can't discover the celestial bodies.
3. It becomes hotter.
4. The effect of gravity force decreases.
5. They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.



- 6 Its outer surface burns only and the remaining part of it without burning falls on the Earth's surface

11

Stars	Planets	Moons
They are big & hot bodies emit enormous amounts of heat and light	They are spherical opaque bodies revolve around the Sun in elliptical paths	They are followers of small space bodies that are affected by the gravity of the planets that rotate around them

- 2 Look at the main book on page (154)

P.A.A.	Jupiter planet	Mars planet
The distance from the Sun	It occupies the fifth order	It occupies the fourth order
The number of moons rotating around it	62	2

4. Look at the main book on pages (157 & 158)
 5. Look at the main book on pages (152 & 157).
 6. Look at the main book on page (157).

12 1 Distance in km = $6 \times 9.467 \times 10^{12}$
 $= 56.802 \times 10^{12}$ km

2 Distance in light year = $\frac{28.401 \times 10^{12}}{9.467 \times 10^{12}}$
 $= 3$ light years

- 13 () 1 Their distances from the Sun
 Mercury - Venus - Earth - Mars - Jupiter - Saturn - Uranus - Neptune

- 2 The acceleration due to gravity on their surfaces : Mars - Mercury - Uranus - Venus - Saturn - Earth - Neptune - Jupiter

- (2) Identifying the celestial bodies - Reflecting and refracting telescopes

- (3) Milky Way galaxy
 2 Oval shape with coiled spiral arms
 3 On one of its arms

- (4) The Sun - 8 planets.

- (5) Mass of each object and the distance between them.

- (6) 1 1986 - 76 = 1910 2. 1986 + 76 = 2062

- (7) Yes, because the acceleration due to gravity on the surface of planet Mars is less than that on the surface of planet Earth.

- 14 ① 1 the planet 2 the Sun
 3 the gravitational force. 4 the orbit

- (2) 1. Fig. (A) Refracting telescope
 Fig. (B) Reflecting telescope
 2 They are used in identifying the celestial bodies

- (3) 1 Milky Way galaxy
 2 It consists of a tremendous collection of stars.
 3 the position of the Sun.

- (4) 1 Comet.
 2 ① The head. ② The tail.

Thinking Skills Questions

- 1 1 (A), b (B), d 2 a

- 2 (A) 1 1 Saturn (2) Neptune 3 Uranus
 2 (2)

- (B) 1 Path of the planet (orbit) - Semi-circular or oval
 2 Moon

- 3 A → B → D → C

The effective factor the distance between the Sun and the planet

- 3 (n)

- 4 The planets will leave their orbits and float in a random fashion in space and therefore there will not be solar system

- 5 The first monitoring for Halley's comet in 1682
 • The second monitoring for Halley's comet in 1758, i.e. after 76 years from the first monitoring, so the scientist Halley doesn't see it, because he died in 1743

6

The solar system	The oxygen atom
<ul style="list-style-type: none"> The Sun is the centre of the solar system and most of the mass of the solar system is concentrated in the Sun Planets revolve around the Sun in fixed orbits 	<ul style="list-style-type: none"> The nucleus is the centre of the atom and most of the mass of the atom is concentrated in its nucleus Electrons revolve around the nucleus in fixed orbits (energy levels)
<ul style="list-style-type: none"> There are 8 planets revolve around the Sun 	<ul style="list-style-type: none"> There are 8 electrons revolve around the nucleus

Lesson 2

- 1 b 2 a 3 a 4 b 5 d 6 d
7 e 8 d 9 b 10 c 11 d 12 d
13 e 14 b 15 d 16 b 17 b 18 c
19 c 20 c 21 a 22 c 23 c 24 c
25 b 26 a

- 2 (A) 1 c 2 a 3 d 4 b
(B) 1 d 2 c 3 a 4 e
(C) 1 d 2 e 3 a 4 c

- 3 1 (✓)
2 (X) ... at the equator is ... between the two poles
3 (✓) 4 (✓) 5 (✓)
6 X is a mixture of ... with different ratios
7 (X) ... of carbon ...
8 (X) Nitrogen gas ... of oxygen gas ...
9 (X) decreases ...
10 (X) ... is less than the percentage of nitrogen gas and is more than
11 (✓) 12 (X) Nitrogen gas ...
13 (X) ... ultraviolet rays
14 (X) ... 71 % of ...
15 (X) The green colour
16 (X) ... 97 %
17 (X) The water of rivers is ... 18 (✓)
19 (X) ... due to the gravity. 20 (✓)
21 (✓) 22 (X) the Earth's crust
23 (✓) 24 (X) the Earth's crust
25 (✓) 26 (✓)

- 4 1 The Earth. 2 Atmosphere
3 Oxygen gas. 4 Nitrogen gas.
5 Carbon dioxide gas
6 Photosynthesis process.
7 Ice age 8 Ground water
9 Water 10 Earth's crust
11 Mantle 12 Inner core
13 Outer core

- 5 1 gravity 365.25 2 third 150 million
3 a slight flattening indented outward
4 tropical polar 5 inner
6 6386 km - 5.9×10^{24} kg
7 Earth's atmosphere Earth's hydrosphere
8 white 9 0.03 % - 21 %
10 nitrogen 71 % 11 carbon dioxide
12 Oxygen - nitrogen 13 Nitrogen
14 ozone

- 15 Wind movement clouds formation
16 burning millions of small falling meteor
reducing the high speed of large meteorites
17 71 % salty fresh
18 Rivers lakes seas oceans
9 pores and cracks
20 Water - temperature, 21 76 cm.Hg
22 mantle - core 23 crust - whole
24 Earth's crust Earth's core
25 8 - 60 km. 26, outer - inner
27 Iron - nickel

- 6 1 Because the Earth is slightly flattened at its poles and indented outward at the equator
2 Because it is the biggest (inner planet) and it is smaller than any planet from the outer planets
3 Due to the presence of the atmosphere that appears as a white colour around the Earth
4 Because the expansion of atmosphere in space helps in burning millions of small falling meteor completely before reaching the Earth's surface
5 Because it protects living organisms from the harmful ultraviolet radiations
6 Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun
7 Due to the gravitational force of the Earth
8 Due to the gravitational force of the Earth
9 Due to
The presence of hydrosphere
- The presence of the atmospheric envelope containing oxygen gas which is needed for life
- Its temperature is suitable during both day and night
Its atmospheric pressure and its gravitational force are suitable
10 The Earth has a force of gravity that makes the life possible through
- Constancy and steadfastness of objects and living organisms on its surface
Steadfastness of the hydrosphere position on its surface
Keeping the Earth surrounded by the atmosphere
11 As a result of the revolution of the Earth around its centre, the heavy metals descended towards the centre of the Earth and the light components in density ascended upwards. This led to the formation of a number of Earth's layers.



- 2 Due to the high temperature of Earth's core
13 Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.

- 1 (22 km), 2. (365.25 days)
3 (150 million km)
4 (6386 km approximately).
5 (5.9×10^{24} kg). 6 78%
7 (21%) 8 1%
9 (71%) 10 99%
11 (3%) 12 76 cm Hg
13 6400 km approximately
14 2885 km approximately
15 (2100 km approximately)
16 (1350 km approximately)
17 (3450 km approximately)

- 1 2 & 3 Look at the main book on page (174).
4 & 5 Look at the main book on page (175).
6 It protects living organisms from the harmful ultraviolet rays.
7 & 8 Look at the main book on pages (176 & 177).
9 The temperature on Earth's surface is suitable for the continuation of the life of living organisms.

- 1 The combustion processes will be fast and proceed without any control
2 There is no life
3 The ultraviolet rays will reach the Earth's surface and harm living organisms.
4 The Earth will not keep its atmosphere; the hydrosphere will not settle in its position and all objects on Earth's surface will move in a random way that causes the difficulty in the continuity of life

- 1 & 2 Look at the main book on page (174).
3 & 4 Look at the main book on page (176).
5 & 6 Look at the main book on page (178).

- 1 Earth
a **Shape** It is a spherical object with a slight flattening at the two poles and indented outward at the equator.
b **Volume** It is the planet of the fourth order in volume.
c **Mass** 5.9×10^{24} kg
4 The Earth completes one revolution around the Sun in 365.25 days.

② Look at the main book on page (173).

- ③ Look at the main book on page (178).
④ 1 Nitrogen - Oxygen - Water vapour and other gases Carbon dioxide
2 Inner core Outer core Lower mantle Upper mantle Crust.

- 12 ① 1 core 2. mantle 3 crust.
② 1 (1) Earth's crust. (2) Mantle
(3) Outer core. (4) Inner core.
2 (3)
3. (2100 km approximately)
4 590 km approximately
4 ticked solid

Thinking Skills Questions

- 1 a 2. a 3. a
2 A few organisms will die because oxygen gas is used in respiration process.
2 The air pressure will become unsuitable for the continuation of life
3 • 78% Nitrogen gas • 21% Oxygen gas
• 0.03% Carbon dioxide gas.
• 0.97% Water vapour and other gases.
2 Look at the main book on page (174).
4 No because the percentage of oxygen in its atmosphere is low the percentage of carbon dioxide is very large, has no water and it will be exposed to harmful cosmic radiation because its atmosphere does not contain the ozone layer.

Lesson 3

- 1 1 c 2 d 3 a 4 c 5 b
6 a d 8 b 9 a 10 c
d 2 a 13 b 14 a 5 b
16 c 17 a 18 b 19 d 20 c
21 b 22 d 23 d 24 b 25 a
2 1 b 2 c 3 a
3 c 2 d 3 a
3 1 a B 2 d C 3 b A
4 1 (✓)
2 (X) ... through the soil of the Earth's crust
3 (X) The rock consists of one mineral or a group of minerals.
4 (X) ... of volcano.
5 (X) ... form the plutonic rock



6. (✓) 7. (X) ... a type of igneous rocks.
 8. (✓) 9. (X) ... an igneous rock.
 10. (✓) 11. (✓) 12. (✓)
 13. (✓) 14. (X) ... increases by
 15. (X) The lower ...
 16. (X) ... in sandstone rock. 17. (✓)
 18. (X) ... calcium carbonate
 19. (X) Carbon dioxide gas ... 20. (✓)
 21. (X) Marble is an example of metamorphic rocks
 22. (X) The white

- 5 1 Soil 2 Rock
 3 Magma 4 lava
 5 igneous rocks 6 Volcanic igneous rock
 7 Plutonic igneous rocks
 8 Granite 9 Basalt
 10 Sedimentary rocks
 11 Sandstone 12 Limestone
 13 Metamorphic rocks

- 6 1 soil solid hard
 2 Soil non-compacted
 3 mineralogical substances water organic
 4 igneous sedimentary metamorphic
 5 the Earth's crust magma volcanic flows lava
 6 plutonic rocks volcanic rocks
 7 large small 8 granite basalt
 9 plutonic volcanic 10 granite basalt
 11 quartz feldspar mica oxide pyroxene
 12 75% 5%
 13 erosion transportation deposition
 14 aqueous action
 15 Sandstone limestone
 16 white smooth yellow coarse
 17 quartz
 18 calcium carbonate lime
 19 Sandstone ? mm 20 hydrochloric
 21 Calcite (CaCO₃) 22 carbon dioxide
 23 igneous sedimentary metamorphic
 24 mass rock 25 limestone

- 7 1 Because the upper part is fragmented and loosened layer but the lower part is a solid material that consists of different types of rocks
 2 Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize so, their crystals are large-sized.

- 3 Because the minerals that form it don't take the time required for crystallization, where lava cools quickly on the surface, therefore their crystals become small-sized.
 4 Due to the extruding of gases from volcanic flows during their cooling and formation of rock
 5 Because the size of crystals of minerals forming granite is large, while the size of crystals of minerals forming basalt is small.
 6 Because it is a plutonic rock which has large crystals
 7 Because it is a volcanic rock which has very small crystals
 8 Due to the precipitation of calcium carbonate in lime solutions
 9 Due to evolving of carbon dioxide gas
 10 Because the sediments exist in the lower layers are exposed to high pressure resulted from the weights of the deposits above them, this causes a decrease in the ratio of water existing between the grains
 11 Because sandstone is yellow in colour and its texture is coarse, while limestone is white in colour and its texture is smooth
 12 Because if it contains impurities, it is coloured and if it's pure, it is white

- 8 1 It is extruded in the form of volcanic flows and it is called lava
 2 Volcanic igneous rocks are formed
 3 Plutonic igneous rocks are formed
 4 Their crystals become large sized
 5 Their crystals become small-sized
 6 Small circular holes are formed inside the rocks
 7 Water takes the smooth sand in its way and the sand deposits at the lower part, while shingle and gravel remain at the upper part
 8 The grains become solid and appear as layers above each other, the layers in the bottom are older and the above ones are more recent
 9 An effervescence takes place due to evolving of carbon dioxide gas
 10 They are converted into metamorphic rocks.
 11 Marble is formed
 12 Limestone is formed

- 9 1 It is a thin non-compacted layer which covers the Earth's crust
 2 It is a natural solid material, that exists in the Earth's crust and it is formed of one mineral or a group of minerals.



- It is a very hot thick (viscous) liquid underneath the Earth's crust.
- It is the magma when it reaches the Earth's surface.
- They are rocks formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.
- They are rocks formed from the fragmentation and sedimentation of old rocks.
- They are rocks originated as a result of exposing the old rocks (igneous or sedimentary) to the factors of pressure and high temperature.

10

Odd word	Scientific name of the rest
1 Basalt	Minerals forming granite
2 Mica	Minerals forming basalt
3 Calcite	Minerals forming granite
4 Solidification	Stages of formation of sedimentary rocks

11 Look at the main book on page (190).

2 Look at the main book on page (192).

P.O.C	Magma	Lava
• Definition	It is a very hot thick liquid underneath the Earth's crust.	It is the magma when it reaches the Earth's surface.
• The resulting rocks	Plutonic igneous rocks	Volcanic igneous rocks
• Place of formation	The depth of the Earth's crust	The Earth's surface

4. Look at the main book on page (193).

5. Look at the main book on page (196).

6. Look at the main book on page (198).

12

- Granite 2 Basalt
1 Sandstone + 1 Limestone
5 Marble

13

- Igneous rocks
- Sedimentary rocks
- Metamorphic rocks
- Plutonic rocks
- Volcanic rocks
- Erosion
- Transportation
- Sedimentation
- Metamorphic rock
- 2 & 5 Igneous rocks
- 3 & 4 Sedimentary rocks

- Quartz, feldspar and mica
- Olivine, pyroxene and feldspar
- Calcite

6

Characteristics	Plutonic igneous rocks	Volcanic igneous rocks
• Size of crystals	Large	Small
• Texture	Coarse	Smooth
• Holes	Absent	Present

7 Pressure and high temperature

8 By adding hydrochloric acid

Sandstone	Limestone
No reaction takes place	An effervescence takes place when hydrochloric acid is added to limestone due to evolving carbon dioxide gas

- Granite
- Sandstone
- Marble

10 1 Rock (A) : Plutonic igneous rock.

Rock (B) : Volcanic igneous rock

2 The difference between the size of crystals of minerals in the two samples.

3 Rock (A) : Granite

Rock (B) : Basalt

11 Marble is originated as a result of exposing limestone to the factors of pressure and high temperature so that it has more solidity and cohesive than the limestone.

Thinking Skills Questions

1 1 d

2 b

3 d

2

1 (1) Limestone.

(2) Pressure and high temperature

2 Answer by yourself

3 Marble is from metamorphic rocks, while limestone is from sedimentary rocks.

3

1 • Rock X : igneous volcanic rock Basalt

• Rock (Y) : Metamorphic rock Marble

2 Plutonic igneous rocks are formed

2

guide Answer

of

Worksheets



Worksheet 1

1. 1. Bromine mercury 2. loses positive ion.
3. 7 - 8 4. bad graphite
5. metals nonmetals noble gases

2. 1. d 2. a 3. b 4. c 5. a

3. A. 1. Negative ion. 2. Positive ion
3. Noble gases

- B. 1. (a) is less than
2. (a) one electron
3. (a) ... of nonmetals

4. A. Because fluorine atom has more electrons than the number of protons

2. Because aluminium ion is formed when aluminium atom loses three electrons and changes into (Al^{3+}) which contains 10 electrons, while nitrogen ion is formed when nitrogen atom gains three electrons and changes into (N^{3-}) which contains 10 electrons too

3. Because sulphur atom $(_{16}S)$ gains two electrons during the chemical reaction while calcium atom $(_{20}Ca)$ loses two electrons, so the number of energy levels in each of them becomes three

- B. 1. They are solids except mercury (Hg) which is the only liquid metallic element. They have metallic luster. They are good conductors of heat and electricity. They are malleable and ductile.

Worksheet 2

1. 1. Metal 11 2. 11
3. ionic bond

2. A. 1. is a chemical bond resulting from the electrostatic attraction between a positive ion and a negative ion.
2. is a chemical bond originated between two atoms or molecules through sharing of each atom with a number of electrons to complete the outer electron shell of each atom.

- B. 1. Because it arises by sharing each hydrogen atom with only one electron to complete its outermost shell with two electrons and becomes more stable

2. Because potassium atom $(_{19}K)$ tends to lose the outermost electron and changes into positive ion, while chlorine atom $(_{17}Cl)$ gains the electron which is lost by potassium atom and changes into negative ion, then electrostatic attraction occurs between positive and negative ions (ionic bond)

3. 1. sodium (Na) - chlorine (Cl)
2. ionic - triple covalent
3. positive - negative

Worksheet 3

1. 1. trivalent - divalent 2. $NaOH - H_2SO_4$
3. gain share with 4. $(HCO_3)^-$ monovalent
5. sodium chlorine

2. A. 1. is the number of electrons that an atom gains, loses or even shares during a chemical reaction.
2. This means that this molecule consists of one atom of silver element and one atom of chlorine element

- B. 1. $AgCl$ 2. Na_2SO_4
3. $Mg(OH)_2$ 4. $(NH_4)_2CO_3$
5. $Ca_3(PO_4)_2$

3. A. 1. c 2. b

- B. 1. Atomic group (radical)
2. Chemical formula

4. A. 1. is the number of valence electrons in an element

2. is tetravalent
3. is zero

- B. 1. Because during the chemical reaction, sodium atom loses one electron, while calcium atom loses two electrons to complete their outermost shell.

2. Because aluminium is trivalent and oxygen is divalent

Worksheet 4

1 A. 1. Bases.

2. Salts.

- B. 1 Because acids when dissolved in water produce positive hydrogen ions (H^+) which responsible for their properties
- 2 Because limewater contains negative hydroxide ion, while lead sulphate is formed from combination of positive metal ion with negative anionic group

2 A. 1 blue - negative hydroxide

2 soluble insoluble

B. By using litmus paper in each tube

- If it is changed to red, the substance is an acid
- If it is changed to blue, the substance is a base

3 A. 1. 2. 3.

4 A. 1. carbon dioxide 2. Lead sulphate

3. Hydrochloric acid 4. Calcium oxide

B.

Sodium hydroxide	Sulphuric acid
It is a base	It is an acid
It gives on dissociation in water hydroxide ions (OH^-)	It gives on dissociation in water dissociation in water hydrogen ions (H^+)
It has a bitter taste	It has a sour taste
It turns red litmus paper into blue	It changes the colour of litmus paper into red

Worksheet 5

1. 1. electrons

2. positive - negative

3. loss - gained - shared with

4. negative - electrons

2. 1. due to the completeness of its outermost energy level with electron

2. Because acids change the colour of litmus paper into red, while bases change the colour of litmus paper into blue

3. A. Answer by yourself

B. 1. c 2. d 3. c

4. 1. Na_2O 2. $CuSO_4$
3. Na_2CO_3 4. HCl

B. 1. It is the atom which loses or gains an electron or more during the chemical reaction

2. It is a set of atoms of different elements joined together and behave like one atom during a chemical reaction, having its own valency and it is not existed singly

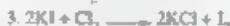
Worksheet 6

1. A. 1. double covalent - two active oxygen

2. oxygen magnesium oxide



$$\begin{aligned} \text{The mass of the products} &= 2(24 + 16) \\ &= 2 \times 40 \\ &= 80 \text{ gm} \end{aligned}$$



2. 1. Due to the formation of magnesium oxide (white powder) as a result of combination of oxygen with magnesium



2. To achieve the law of conservation of matter

3. 1. It is the breaking of the existing bonds between the atoms of the molecules in the reactant and forming of new bonds between the atoms of the molecules in products

2. The chemical compound is produced from combination of its elements, so it contains weight ratios.

4. Word equation Hydrogen + Oxygen \rightarrow Water

Symbolic equation :



$$\begin{aligned} \text{The sum of reactants masses} &= 2(2 \times 1) + (2 \times 16) \\ &= 4 + 32 = 36 \text{ gm} \end{aligned}$$

The sum of products masses = $2(2 + 16) = 36 \text{ gm}$

The sum of reactants masses = The sum of products masses which achieves the law of conservation of matter

Worksheet 7

- 1 White clouds of ammonium chloride are formed



- 2 Carbon dioxide is produced



- 2 A 1 Direct combination reactions

2 Sulphur oxides

3 Carbon dioxide gas

B. Answer by yourself

- 3 1 Because during lightning nitrogen oxides are produced

2 Because they poisonous acidic gases that affect the nervous system and the eye

4

P	O	C	Carbon oxides	Sulphur oxides
1	Examples		Carbon monoxide (CO) Carbon dioxide (CO ₂)	Sulphur dioxide (SO ₂) Sulphur trioxide (SO ₃)
2	The negative effect		Carbon monoxide causes headache, dizziness, severe stomach aches and may lead to death. Increasing the air of carbon monoxide gas in air leads to increasing the air temperature.	They cause respiratory system malfunction because they are acidic gases and cause building corrosion.

General Exercises of the School Book on Unit One

- 1 Valency
2 Ionic bond
3 Acids
4 Chemical reaction
5 Atomic group
6 Chemical equation
7 Bases

2 A. Answer by yourself.

B. 1, 2 & 3 Look at the main book on pages (15, 24 & 16).

4 Look at the main book on page (50)

- 3 A. 1 Carbon + Oxygen $\xrightarrow{\Delta}$ Carbon dioxide
 $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$

- 2 Carbon monoxide + Oxygen

$\xrightarrow{\Delta}$ Carbon dioxide



- 3 Ammonia + Hydrochloric acid

$\xrightarrow{\text{conc.}}$ Ammonium chloride



- B. 1 $\text{Ca}(\text{NO}_3)_2$



C. Answer by yourself

Model Exam 1 on Unit One

- 1 A. 1 1/2

2 (a) ... nitrate group is $(\text{NO}_3)^-$, while that of nitrite group is $(\text{NO}_2)^-$

3 (a) 6 atoms for three ...

4 (a) two positive charges

- B. 1 Sodium nitrate

2 Calcium hydroxide

3 Sulphuric acid

4 Sodium oxide

- C. It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction

- 2 A. 1 Nitrogen oxides

2 Bases

3 graphite

4 white

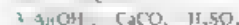
B.

Element	Electronic configuration			1 st type	2 nd Type of (ion)	3 rd Valency
	K	L	M			
18 Ar	2	8	8	Noble gas	Non-ion	Zero
12 Mg	2	8	2	Metal	Positive	Divalent
16 S	2	8	6	Nonmetal	Negative	Divalent
8 O	2	6		Nonmetal	Negative	Divalent
11 Na	2	8	1	Metal	Positive	Monovalent

- C. To achieve the law of conservation of matter (mass)

- 3 A. 1 two, one

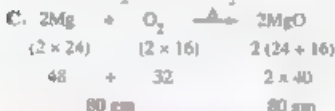
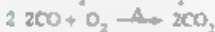
2 air - lung cancer



4 ionic bond - single covalent bond

- B. 1 By putting litmus paper, if the litmus paper changes into Red so, it is H_2SO_4
Blue so, it is $\text{Ca}(\text{OH})_2$
- 2 By adding water with shaking
- If it is soluble in water so, it is (NaCl)
- If it is insoluble in water so, it is (AgCl)
- C. It changes into a positive ion carries a number of positive charges equals to the number of given electrons

1 A. 1 c 2 d 3 a 4 d



- The sum of reactants masses = 80 gm
- The sum of products masses = 80 gm.

Model Exam 2 on Unit One

1 A. 1. chemical reaction

2. triple covalent bond

3. Valency

4. Atomic group

B. 1 $\text{Fe}(\text{OH})_3$

2 $\text{Al}_2(\text{SO}_4)_3$

3 $\text{Cu}(\text{NO}_3)_2$

4 Na_2CO_3

C. Because acids when dissolved in water produce positive hydrogen ions H^+ which responsible for their properties, while bases when dissolved in water produce negative hydroxide ions $(\text{OH})^-$ which responsible for their properties

2 A. Sodium \rightarrow The rest are nonmetal elements

2 HCl \rightarrow The rest are salts

3 H_2O \rightarrow The rest are acids

4 Respiratory system is a function \rightarrow The rest are the negative effects of carbon monoxide

B. 1 A base

3. An acid.

2 A metal oxide

4. A salt.

C. 1 A nonmetallic element

2 divalent tetravalent hexavalent

- 3 A. 1 Calcium oxide sodium oxide -
carbon dioxide sulphur trioxide
2 carbon dioxide 3. metals nonmetals
4. Nitrogen - sulphur

B. 1



2, 3, 4 Answer by yourself

C.

The atom	The ion
It is electrically neutral in its ordinary state	It is positively or negatively electric charge
1 The number of electrons equals the number of protons	1 The number of electrons is more or less than the number of protons
2 The outermost energy level is not completely filled with electrons	2 The outermost energy level is completely filled with electrons
3 The outermost energy level is not completely filled with electrons except noble gases	

4 A. 1 Argon

2 Hydroxide group

3 Copper

4 Sodium sulphide

B. 1 b 2 d 3 a 4 c

C. Increasing the temperature

Worksheet 8

1 A. 1. It is an effect attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion

2 It is the ability of the Earth to attract that object to its centre

B. 1 force - direction

2 Gravitational forces - nuclear forces

2 A. 1 c 2 a 3 c

B. 1 Because Earth's gravitational acceleration changes from one place to another



2 Because the force acting on the wall is improper

3 A. 1 Weight = Mass \times Earth's gravitational acceleration

$$= 5 \times 10 = 50 \text{ newton}$$

$$\begin{aligned} 2 \text{ Mass} &= \frac{\text{Weight}}{\text{Earth's gravitational acceleration}} \\ &= \frac{392}{9.8} = 40 \text{ kg} \end{aligned}$$

B. 1 (x) 2 (✓) 3 (x)

4 1 Its weight will increase

2 It will move from its position.

Worksheet 9

1 1 b 2 c 3 a

2 A. 1 strong nuclear
2 weak nuclear forces - strong nuclear forces
3 nucleus. 4 electric - mechanical

B. 1 They are used in producing electric energy from the nuclear energy and in military purposes

2 They are used to get radioactive elements and radiations which are used in

- Medicine
- Scientific researches
- Industry

3 1 Gravitational forces
2 Electromagnetic forces
3 Strong nuclear forces
4 Weak nuclear forces

Worksheet 10

3 A. 1 Force of inertia friction force
2 rushed back - inertia

B. 1 a 2. b

2 Fig. (1) The bus stops suddenly, because the passenger is rushed forward due to inertia as he tries to maintain his state of motion
Fig. (2) The bus moves suddenly, because the passenger is rushed backward due to inertia as he tries to maintain his state of rest.

3 A. It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it

B. 1 (✓) 2. (x) inertia is

4 1 Due to inertia, as they try to maintain their state of motion.

2 Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs

3 Due to inertia, as he tries to maintain his state of motion

Worksheet 11

1 A. It is the resistant force (against motion) originated between the object in motion and the medium touching it

B. 1 (✓)

2 (x) ... from the lower concentration to the higher one

3 (x) ... to increase friction forces

2 1. • It prevents feet from slipping on roads during walking
• It helps to stop and start car motion.
• It helps in turning of match

2. Look at the main book on page (119).

3 1 To decrease friction between moving parts of machines and prevent their erosion
2 To increase friction between tyres and the road to help car in starting and stopping motion.

Worksheet 12

1 1 friction force. 2. the electric bell.
3 forces inside living systems
4 nuclear energy 5 friction

2 Answer by yourself

3 A. 1 Object's weight. 2. Friction forces.
3. Electric generator
B. • The weight of the person on Earth's surface
 $= m \times g = 75 \times 9.8 = 735 \text{ N}$
• The weight of the person at a height of 200 km $= 75 \times 9.2 = 690 \text{ N}$
• The amount of decrease in weight $= 735 - 690 = 45 \text{ N}$

- 4 A. 1 safety belts - inertia.
2 electric - magnetic
3 lower - higher
B. 1 The mass of the bird remains fixed, while the weight of the bird decreases.
2 The driver and the passengers will be rushed forward.

Worksheet 13

- 1 A. 1 The movement of the Moon around the Earth
2 The motion produced after throwing a stone in water
3 The motion of the simple pendulum.
B. 1 b 2 c

- 2 1 is a motion which is regularly repeated at equal periods of time
2 It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference.
3 It is the motion in which the object's position is changed relative to a fixed point (or a fixed frame of reference) from time to time between initial and final positions.

- 3 1 Car motion train motion
2 backward
3. transitional periodic

- 4 Fig (1) & (3) Transitional motion
Fig (2) & (4) Periodic motion

Worksheet 14

1

Mechanical waves	Electromagnetic waves
1 They are produced by the vibration of the medium particles	1 They are α -inspired by electromagnetic forces.
2 They need a medium to transfer through	2 They spread in all media and free space
3 Their speed is relatively low	3 Their speed is extremely high equals $300 \text{ million m/sec}$
Examples • Sound waves • Water waves	Examples • Light waves • X rays • Radio waves

- 2 A. 1. Ultraviolet - infrared

2. mechanical waves - electromagnetic waves

- B. 1 (a) 2 (✓)

- 3 1 Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves
2 Because the sunlight is electromagnetic waves which can travel through free space, while the sound of atomic explosion is mechanical waves which can't travel through free space
3 Because sound is mechanical waves which can't travel through free space

- 4 A. Answer by yourself

- B. 1. = X-rays

= They are used in studying the inner structure of minerals crystals

- 2 Answer by yourself

General Exercise of the School Book on Unit Two

- 1 1 d 2 b 3 b 4 c 5 a
6 c 7 c 8 c

- 2 A. 1 It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference
2 It is a motion which is regularly repeated at equal periods of time
3 This means that the amount of Earth's gravitational to this object is 60 newton
4 It is a property of an object that has to resist the change of its state of rest or motion at a regular speed in a straight line unless an external force acted on it
B. 1 Because the distance between the Earth's surface and the centre of the Earth changes from one place to another due to non-spherical shape of the Earth
2 Because Earth's gravitational acceleration changes from one place to another
3 Due to inertia, as they try to maintain their state of motion.
C. 1 Transitional motion
2 Weight



Model Exam 1 on Unit Two

1 A 1 d 2 d 3 a 4 d

B. 1. Electromagnet

2. Electric energy changes into magnetic energy

3. The pins will fall - The electric current has a magnetic effect

C. It helps in stopping and starting cars motion.

2 A. 1. the object in motion - the medium touching it

2. its weight - its mass

3. stringed - pneumatic

4. electricity - military

B. The pen doesn't fall on the ground on pulling the paper quickly, due to inertia which makes objects resist the change of their rest state

C. Object's mass

$$= \frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$$

$$= \frac{98}{9.8} = 10 \text{ kg}$$

3 A. 1. Force 2. Mechanical waves.

3. Periodic motion 4. Weight

B. 1. They are used in photographing bones to detect the sites of bone fractures.

2. It helps in stopping and starting car's motion

3. They are used in making remote sets.

4. It is used to get radioactive elements and radiations which are used in

- Medicine
- Scientific researches
- Industry

4. Because they have heat effect property

4 A. 1 d 2 c 3 a

B. 1. (*) 2. (*) 3. (✓) 4. (✓)

C. Light waves - from electromagnetic waves
Sound waves - from mechanical waves

Model Exam 2 on Unit Two

1 A. 1. electric 2. stopping

3. mechanical 4. vibrating

B. 1. They are used to lift scrap iron and cars in ports

2. It is used to get radioactive elements and radiations which are used in medicine scientific researches and industry

3. They are used in medical purposes as the treatment and discovering of some swellings.

4. It is used in light shows

C. They are waves that need a medium to transfer through

2 A. 1. c 2. b 3. c 4. b

B. 1. less 2. less 3. decreases

C. The iron bar is changed into a temporary magnet

3 A. 1. (*) is equal to

2. (*) Contraction and relaxation of muscles

3. (✓)

4. (*) ... mechanical energy into

B. 1. Forces of inertia

2. Friction forces

3. Forces inside living systems

4. Forces inside living systems

C. Because sound is from mechanical waves, while light is from electromagnetic waves

4 A. 1. Nuclear force 2. Inertia

3. Force

4. Transitional motion

B. 1. Sound waves - Electromagnetic waves

2. Friction force - Fundamental forces in nature

3. Light waves - mechanical waves

4. Handbell - Applications of electromagnetic forces.

Translational motion	Periodic motion
It is a motion in which the object's position is changed continuously with time relative to a fixed point.	A motion which is regularly repeated at equal periods of time.
It has initial and final positions.	It doesn't have initial or final positions.
Examples A bicyclist motion A car motion A car motion	Examples A rotating motion: As the rotation of the sample pendulum A circular motion: As the movement of the Moon around the Earth A wave motion: As the motion of water waves

Worksheet 15

1. A. 1, the names of the two objects – the distance between them
2 Mercury Neptune
3 Milky Way galaxy – Chopped Hay galaxy.
- B. 1 They are the greatest units that form the universe
2 It is any body swims in the space such as stars, planets, moons and rocky or gaseous bodies.

2

Points of comparison	The inner planets	The outer planets
Definition	They are the nearest four planets to the Sun	They are the outer three planets from the Sun
Their arrangement from the Sun	Mercury, Venus, Earth and Mars	Jupiter, Saturn, Uranus and Neptune
Structure	Rocky bodies	Gaseous bodies
Size	Small in size	High in size
Density	High	Low
No. of moons orbiting around them	A few number moons except Mercury has no moons	A large number of moons
Atmosphere	A + them have an atmosphere except Mercury	A + them have an atmosphere

- 3 A. 1 Because they consist mainly of gaseous bodies.

2 Because these distances are too huge to be measured by kilometres.

B. 1 b 2 d 3 b

$$\begin{aligned}
 \text{1 A Distance in light year} &= \frac{\text{Distance in km}}{2.4 \times 10^8} \\
 &= \frac{75.736 \times 10^{12}}{9.467 \times 10^{12}} \\
 &= 8 \text{ light years}
 \end{aligned}$$

B. 1 Light year 2 The Sun

C. They are used for identifying the celestial bodies.

Reflecting telescope and refracting telescope

Worksheet 16

- 1 1 Meteors 2 Meteor

3 The belt of the wanderer asteroids

4 Halley's comet

- 2 A. 1 ✓ 2 ✗ Mars and Jupiter

3. - They are masses of rocks, ice and solid, fixed gases which revolve around the Sun in more elongated elliptical orbits intersecting with the orbits of the planets.

They consist of two parts which are

- 1 The head It contains icy spheres which are a mixture of

Solidified gases [carbon dioxide, nitrogen and methane gases]

Rocky parts

- Dust and water molecules

- 2 The tail It consists of a gaseous cloud

- The most famous comet is Halley's comet which completes its revolution around the Sun each 76 years

3 1 b 2 c 3 d 4 b

- 4 1 Because the gravity of planet increases by increasing its mass and Jupiter is the biggest planet in mass.

2 Due to the difference in the gravity acceleration from a planet to another



Worksheet 17

- 1 6386 km 5.9×10^{24} kilograms
 2 a slight flattening - indented outward
 3 Ozone ultraviolet
 4 third 150 million
 5 carbon dioxide
- 2 A 1 reduces the effect of oxygen gas in burning processes.
 Plants use it to form proteins
 2 It is used in respiration process of living organisms.
 - It helps in combustion process of fuels

B. 1 nitrogen 2. 365.25

- 3 1 Due to the presence of the atmosphere that appears as a white colour around the Earth
 2 Because it is the biggest inner planet and it is smaller than any planet from the outer planets

- 4 The atmosphere The hydrosphere
 The suitable temperature. - The gravity.
 - The suitable atmospheric pressure

Worksheet 18

Salty water	Fresh water
It represents 97% of the water area on the Earth's surface	It represents 3% of the water area on the Earth's surface
It exists in: • Oceans • Seas	It exists in: • Rivers • Lakes • Snow at the poles • Groundwater

Points of comparison	The inner core	The outer core
• Structure	It is formed of iron and nickel in a solid state	It is formed of molten metals
• Thickness	its radius is about 1,250 km	About 2,01 km

- 2 Plants use water in photosynthesis process to form food

Human benefits from water in

- Completing food digestion and absorption processes in the digestive system.
- Sharing in blood formation
- Keeping the constancy of body temperature

- 3 Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun
- 2 Due to
 The presence of water
 The presence of the atmospheric envelope containing oxygen gas which is needed for life
 Its temperature is suitable during both day and night
 - Its atmospheric pressure and its gravitational force are suitable
- 3 Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre
- 4 Due to the gravitational force of the Earth

4 1. d 2. a 3. d

Worksheet 19

1 1. a 2. c 3. a 4. a

- 2 1 It becomes hotter
 2 The combustion processes will be fast and proceeds without any control.
 3. They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye
 4 The ultraviolet rays will reach the Earth's surface and harm living organisms.

- 3 1 No. of moons rotating around Neptune planet
 2 The acceleration due to gravity on the surface of Mercury planet
 3 The thickness of the outer core
 4 The thickness of the Earth's crust
 5 The average radius of the Earth
 6 The ratio of land on the Earth's surface

- 4 1 rocky gas giants 2. 71
 3. moons 4. Jupiter Mercury

Worksheet 20

- 1 A. 1. Soil. 2. Magma. 3. Rock.

B.

Points of comparison	Granite	Basalt
1 Colour	Pink or grey	Dark
2 Minerals forming it :	Quartz, feldspar and mica.	Olivine, pyroxene and feldspar.
3. Found in :	The Eastern Desert and Sinai Peninsula.	Abou-Zabal, near Abou Rawash and El-Fayoum

- 2 1 igneous sedimentary metamorphic
2 plutonic - volcanic 3 small-sized
4 volcanic flows - lava
5 Granite basalt

- 3 1 Because the upper part is fragmented and loosened layer
2 Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize, so their crystals are large-sized.
3 Because minerals that form there don't take the time required for crystallization, where lava cools quickly on the surface, therefore their crystals become small-sized.
4 Due to the extruding of gases from volcanic flows during their cooling and formation of rock

- 4 1 Igneous rocks are
2 Soil is formed
3 Plutonic rocks are formed
4 Granite

Worksheet 21

- 1 1 An effervescence takes place due to evolving of carbon dioxide gas
2 They convert into metamorphic rocks
3 Limestone is formed

- 2 1 Limestone sandstone - marble
2 erosion - transportation - sedimentation
3 white smooth yellow coarse
4 older recent

- 3 A.1 Sedimentary rocks 3 Marble
3 Sandstone.

- B. 1 (x) Marble has
2 (x) that forms sandstone

- 1 1 Pressure and high temperature
(2) Erosion - transportation and sedimentation
Marble is an example of metamorphic rocks.

General Exercise of the School Book on Unit Three

- 1 1 Magma 2 Volcanic igneous rock
3 Meteorites

- 2 1 elliptical one plane perpendicular
2 quartz - feldspar mica olivine - pyroxene - feldspar

- 3 1 Because the expansion of atmosphere in space helps in burning millions of small falling meteors completely before reaching the Earth's surface
2 Because magma at depth gets cool slowly, therefore minerals take a long time to crystallize, so their crystals are large-sized
3 Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.

- 4 1 b 2. d 3. c

- 5 1 Look at the main book on page (178).
2. Look at the main book on page (196).
3. Look at the main book on pages (157 & 158).

6 Answer by yourself.

Model Exam 2 on Unit Three

- 1 A. 1 (✓) 2. (x) 3. (x) 4. (x)

- B. 1 Light year. 2 Comets.
3. Marble. 4. Moon.

- C. Because the size of crystals of minerals forming plutonic rocks is large, while the size of crystals of minerals forming volcanic rocks is small.

2 A.

Odd word	Scientific name
1 Jupiter	Inner planets
2 Halley.	Planets.
3 The Sun	Planets.
4. Earthquakes	Celestial bodies.



- B. (1) Earth's crust. (2) Mantle.
(3) Outer core. (4) Inner core
C. It protects living organisms from the harmful ultraviolet rays.

- 1 A. 1. 150 million km. 2. 76 cm Hg
3. Ranging from 0.7 to 1.3 g/cm³
4. 3 Moons
B. 1. c 2. b 3. b 4. b
C. The temperature on Earth's surface will increase, so it is not suitable for the continuity of life of living organisms

- 1 A. 1. Ocean - river
2. elliptical - perpendicular
3. Magma volcanic flows lava
4. white water bodies
B. 1. B → F 2. c → D
3. a → B 4. d → C
5. e → E

Points of comparison	Inner planets	Outer planets
1. Definition	They are the nearest four planets to the Sun	They are the farthest four planets from the Sun
2. Their arrangement from the Sun	Mercury, Venus, Earth and Mars	Jupiter, Saturn, Uranus and Neptune

Model Exam 2 on Unit Three

- 1 A. 1. d 2. a 3. a 4. c
B. 1. carbon dioxide 2. limestone
3. Galaxies 4. Volcanic
C. They are rocks formed from the cohesion of sediments
- 2 A. 1. Quartz Feldspar Mica
2. Olivine Pyroxene Feldspar
3. Mineral calcite 4. Quartz
B. 1. Outer core 2. The Earth
3. The belt of wanderer asteroids
4. Milky way galaxy
C. Look at the main book on page (157).

- 1 A. 1. erosion transportation - sedimentation.
2. Nitrogen 78
3. Ozone ultraviolet
4. Sedimentary metamorphic
B. 1. Layer No. (2)
2. Layer No. (1)
3. Layer No. (4)
C. Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun

- 1 A. 1. (a) is smaller
2. (a) is 97%
3. ✓
4. (a) is 76 cm Hg
B. 1. Metamorphic rock
2. Igneous rock
3. Sedimentary rock
4. Igneous rock
C. pressure and high temperature

March Tests

Model 1

- 1 A. 1 d 2 c 3 d 4 d

B. Due to the formation of ammonium chloride as white clouds. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{conc.}} \text{NH}_4\text{Cl}$

- 2 A.
- ☒
- 1

2 (x)

3 (x)

4 (x)

B. It doesn't move, because the force acting on it is improper

Model 2

- 1 A. 1 Positive ion 2 Chemical formula
-
- 3 Object's weight 4 Sulphur oxides

B. To achieve the law of conservation of matter (mass).

- 2 A.
- ☒
- 1 2 (x)

3 (✓) 4 (x)

B. Mass = $\frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$
 $= \frac{80}{10} = 8 \text{ kg}$

Gravitational acceleration on Mars = $\frac{\text{Weight}}{\text{Mass}}$
 $= \frac{12}{3} = 4 \text{ m/sec}^2$

April Tests

Model 1

- 1 A. 1 (x) 2 (✓) 3 (x) 4 (✓)

B. Because they consist mainly of gaseous bodies

- 2 A. 1 c 2 b 3 d 4 a

B. The passengers are rushed forward

Model 2

- 1 A. 1 Friction force. 2 Transitional motion

3 Galaxy

4 Nitrogen

B. Distance in light year = $\frac{28401 \times 10^{12}}{9.46 \times 10^{12}}$
 $= 3 \text{ Light years}$

- 2 A. 1 mechanical 2 electromagnetic

3 The Earth

4 salty

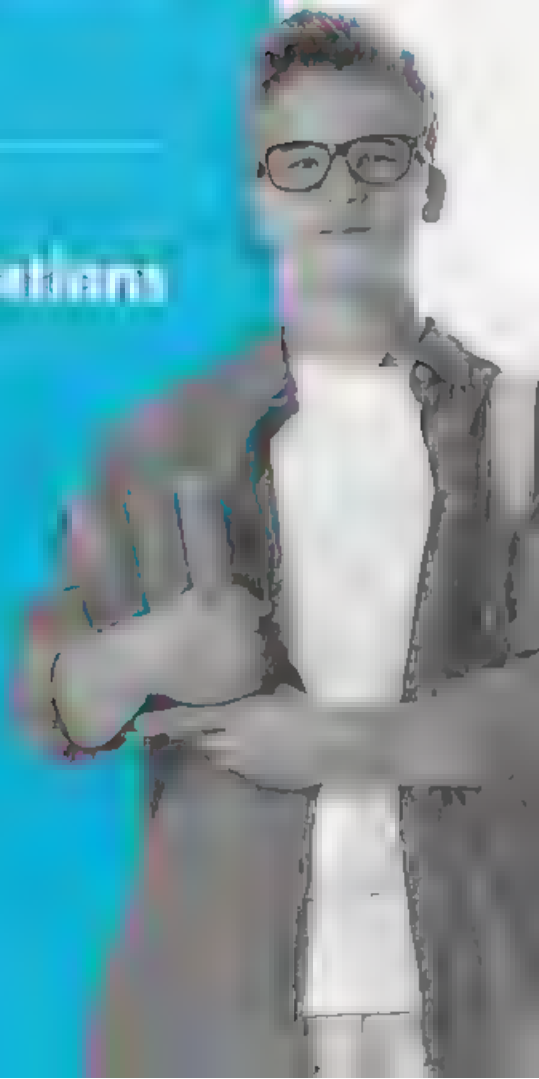
B. Because they have heat effect property

3

Grade 4/5

of

Final Examinations



Cairo Governorate

1 El-Norba Educational Zone

- 1 (A) 1 c 2. b 3. b 4. a
 (B) 1 (✓) 2. (x) 3. (✓) 4. (x)
 (C) White clouds of ammonium chloride are formed

$$\text{NH}_3 + \text{HCl} \xrightarrow{\text{conc.}} \text{NH}_4\text{Cl}$$

 (white clouds)

- 2 (A) 1 d 2. c 3. a 4. b
 (B) 1 Silver chloride and lead iodide
 2 forward inertia
 3 the head and the tail
 4 metals mercury (Hg)

(C) Because their outermost energy level is completely filled with electrons (have 8 electrons, except He, has 2 electrons), so they don't gain, lose or even share electrons

- 2 (A) 1 bases 2 heat
 3 third 4 The inner core
 (B) not a word but a system of others

Train motion	periodic motion
2 Chlorine	Metals
3 Sodium wastes	Electricity suggest
4 Pollution	Chemical industry of earth that support the continuity of the life

(C) Al(OH)_3

- 1 (A) 1 $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$
 2 $\text{NH}_3 + \text{HCl} \xrightarrow{\text{conc.}} \text{NH}_4\text{Cl}$
 3 $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$
 4 $\text{H}_2 + \text{Cl}_2 \longrightarrow 2\text{HCl}$
 (B) 1 The Earth's gravity 2. The force
 3 Covalent bond 4 Positive ion
 (C) Hydrosphere keeps the temperature on land during day and night within the proper limits of living organisms

2 Helipolis Educational Zone

- 1 (A) 1. Ions - positive
 2 quartz, feldspar and mica
 3 Inertia force friction force
 4 plutonic rocks - volcanic
 (B) 1 c 2. d 3. b 4. a
 (C) $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$

- 2 (A) 1 Chemical reaction. 2. Biological force
 3 Lava. 4 Metamorphic rocks
 (B) 1 Positive ion 2. Negative ion
 3 Ionic bond
 4 Double covalent bond
 (C) To reduce friction force between moving parts of machines and prevent their erosion

- 3 (A) 1 (x) 2. (x) 3. (✓) 4 (✓)
 (B) 1 graphite. 2. 365 25 days.
 3. The outer core 4 The sound wave
 (C) Object's weight
 $= \text{Mass} \times \text{Earth's gravitational acceleration}$
 $= 10 \times 9.8 = 98 \text{ Newton}$

- 4 (A) 1 a 2. b 3. c 4. a
 (B) 1 10^5 2. The moon around Sun
 3 Rivers 4 Quartz
 (C) It changes into a negative ion carries a number of negative charges equals to the number of gained electrons

3 East Nary City Educational Zone

- 1 (A) 1 Oxygen 78 2 light sound
 iron and nickel
 3 hydrogen - hydrosulfide
 (B) 1 Al_2O_3 2 Na_2CO_3
 3 CuCl_2 4 Mg(OH)_2
 (C) Object's weight
 $= \text{Mass} \times \text{Earth's gravitational acceleration}$
 $= 10 \times 9.8 = 98 \text{ Newton}$

- 2 (A) 1 Electromagnet. 2. The soil.
 3 Volcanic. 4. Magma.
 (B) 1 (✓) 2. (✓) 3 (x) 4. (✓)
 (C) Mass of reactants $= (2 \times 24) + (2 \times 16) = 80 \text{ gm}$
 Mass of products $= 2 \times (24 + 16) = 80 \text{ gm}$

- 3 (A) 1 b 2. b 3. c 4. a
 (B) 1 friction force, 2. Basalt
 3. 13 atoms. 4. the third
 (C) Due to inertia for the passengers and driver, it makes them resist the sudden stopping of the vehicle to maintain the state of motion so they rush forward

4 (A) 1. Mercury. 2. Sodium chloride.

3. Sandstone

4. Heart muscle contraction and relaxation

(B) 1. Steadfastness of the hydrosphere position on its surface

• Keeping the Earth surrounded by the atmosphere

2. It reduces the effect of oxygen gas during burning processes.

Plants use it to form proteins

3. It is used in making many devices such as

• Electric winches

• Electric bells

4. It helps in stopping and starting cars motion

• It helps in burning match.

(C) It changes into a positive ion carries a number of positive charges equals to the number of given electrons

4 Et-Wally Educational Zone

1 (A) 1. b 2. c 3. d 4. c

(B) First : 1



2. Ionic bond

Second : 1. C 2. A 3. D 4. B

(C) Object's weight

= Mass \times Earth's gravitational acceleration

Mass = $\frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$

$$= \frac{50}{10} = 5 \text{ kg}$$

2 (A) 1. nitrogen gas 2. third

3. plutonic igneous 4. alcohol

(B) 1. periodic motion - transitional motion

2. ultraviolet

3. mechanical waves - electromagnetic waves

4. bases, oxides, salts

(C) Because the sunlight is electromagnetic waves, which can travel through space, while the sound of solar explosions is mechanical waves, which can't travel through space

3 (A) 1. Acids

3. Valency

(B) 1. $\text{Ca}(\text{OH})_2$

3. MgCl_2

(C)

Sandstone

Electromagnet

Transitional motion

2. AgNO_3

4. H_2SO_4

Limestone

(Composition)

It consists of sand grains that are less than 2 mm in diameter

It consists of the precipitation of calcium carbonate from a lime solution

Minerals forming it

The main component: almost = quartz, feldspar

It consists of mineral: calcite = all other carbonate

(Colour)

Yellow

White

Texture

Coarse

Smooth

Coherences

Cohesive

Less cohesive

Shape

It has thin layers

It has thin layers

8 (A) 1. (x) 2. (x) 3. (✓) 4. (x)

(B) 1. Salt 2. Force 3. Newton 4. Metals

(C) Plutonic igneous rocks are formed.

5 Red Et-Farg Educational Zone

1 (A) 1. weight - mass 2. zero, divalent

3. electric winches, electric bells

4. reactants, products

(B) 1. Bromine

2. Light waves

3. Marble

4. Phosphate

(C) Mass of reactants = $12 + (2 \times 16) = 44 \text{ gm}$

Mass of products = $12 + (2 \times 16) = 44 \text{ gm}$

2 (A) 1. Transitional motion. 2. Acids

3. Single covalent bond 4. Basalt

(B) 1. 150 million kilometers. 2. 18 electrons.

3. 2885 km

4. 78%

(C) Object's weight

= Mass \times Earth's gravitational acceleration

Mass = $\frac{\text{Object's weight}}{\text{Earth's gravitational acceleration}}$

$$= \frac{360}{10} = 36 \text{ kg}$$

1 (A)

The odd word	The scientific term
1. Attraction force	Accompanied forces to motion
2. right	Base
3. change	Minerals forming granite
4. Sound waves	Electromagnetic waves

(B) 1 (x) 2 (x) 3 (✓) 4 (x)

(C) 1 $\text{NH}_3 + \text{HCl} \xrightarrow{\text{solid}} \text{NH}_4\text{Cl}$ 2 Combination of a compound with another compound.
3 Salt.

4 (A) 1 c 2 a 3 c 4 c

(B) 1 Sodium hydroxide 2 Base

3 $\text{ZnSO}_4 + \text{Na}$

5 Hydrochloric acid 6 Acid

7 Carbon dioxide 8 Oxide

(C) It is an effect that attempts to change the object's state from being static to motion or vice versa of attempts to change the direction of motion

Giza Governorate

6

1 (A) 1 red - blue 2 forward - inertia
3. double covalent bond triple covalent bond
4 plutonic - volcanic(B) 1 HCl 2 Chlorine
3 Biological force 4. Solidification.(C) Object's weight
= Mass \times Earth's gravitational acceleration
= $10 \times 9.8 = 98$ Newton

2 (A) 1 c 2. b 3. a 4. d

(B) 1 It changes, not a negative ion carries a number of negative charges equals to the number of gained electrons

2 There is no life

3 White clouds of ammonium chloride are formed.

(C) 1 Na_2CO_3 2 Al_2O_3

3 (A) 1. To achieve the law of conservation of matter (mass).

2 Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs

3 Because the Earth's gravitational acceleration changes from one place to another

4 Because sound is mechanical waves which can't travel through free space

(B) 1

Metals	Non metals
• They are elements which contain less than 4 electrons (1 or 2 or 3 electrons) in the outermost energy level They have metallic luster.	• They are elements which contain more than 4 elements (5 or 6 or 7 electrons) in the outermost energy level They have no luster

2

The Earth's crust	The Mantle
It is a relatively light outer layer. The first layer. Ranges between 8 - 60 km approximately	It is a rocky layer. • The second layer About 2885 km approximately

3

Sandstone	Marble
Sedimentary rock	metamorphic rock

4

Ionic bond	Covalent bond
It is a chemical bond resulting from the electrostatic attraction between a positive ion and a negative ion. Ex. $\text{NaCl} - \text{MgO}$	It is a chemical bond originating between the atoms of nonmetals through sharing of each atom with a number of electrons to complete the outer electron shell of each atom

(C) Ozone layer protects living organisms from harmful ultraviolet rays.

4 (A) 1 (x) 2. (x) 3. (✓) 4. (✓)

(B) 1 Bromine. 2. Valency.

3. Fume 4 Carbon dioxide gas

(C) A translation



7 Answer: Educational Zone

1 (A) 1 c 2 b 3 c 4 a

Atom	Electronic configuration				Type of atom
	K	L	M	N	
1. Mg		2	8	2	Metal
2. Ar	2	8	8		Inert gas
3. Cl	2	8			Non-metal
4. Ca	2	8	8	2	Metal

(C) Object's weight

= Mass \times Earth's gravitational acceleration

$$\text{Mass} = \frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$$

$$= \frac{100}{10} = 10 \text{ kg}$$

2 (A) 1. Volcano, 2. Volcanic igneous rock
3. Periodic motion, 4. Object's weight

(B) 1. CO_2 , 2. third
3. Nitrogen, 4. periodic motion

(C) Mass of reactants = $12 + (16 \times 2) = 44 \text{ gm}$
Mass of products = $12 + (16 \times 2) = 44 \text{ gm}$

3 (A) 1. NH_4Cl , 2. ozone

3. mechanical, electromagnetic
4. ionic bond - single covalent bond

(B) 1. (\checkmark), 2. (\checkmark), 3. (\times), 4. (\times)

(C) 1. Nonmetal oxide, 2. Salt, 3. Base

4 (A) 1. Because during chemical reactions potassium atom loses one electron from its outermost shell.

2. Due to inertia for the passengers, it makes them resist the sudden stopping of the vehicle to maintain the state of motion, so they rush forward.

3. Due to the presence of the Earth in a medium position (the third position) according to its distance from the Sun.

4. To achieve the law of conservation of matter (mass).

(B) 1. Light waves, 2. Sodium

3. Atmosphere, 4. HCl

(C) A white powder of magnesium oxide is formed.



8 Answer: Educational Zone

1 (A) 1. ionic bond, 2. limestone.

3. iron - nickel, 4. NH_4Cl

5. Noble gases

(B) 1. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

2. Because acids produce positive hydrogen ions H^+ which responsible for their properties.

(C) Silver chloride (AgCl).

2 (A) 1. b, 2. b, 3. b, 4. b, 5. c

(B) Object's weight

= Mass \times Earth's gravitational acceleration

$$= 50 \times 9.8 = 490 \text{ Newton}$$

(C) 1. H_2SO_4 , 2. NaOH , 3. Al_2O_3

3 (A) 1. Volcano, 2. Magma.

3. Circular motion, 4. Chemical reaction

5. Mechanical waves

(B)

	Positive ion	Negative ion
Definition	It is an atom of a metallic element that loses an electron or more during the chemical reaction.	It is an atom of a nonmetallic element that gains an electron or more during the chemical reaction.
Examples		

(C) A white powder of magnesium oxide is formed



4 (A) 1. mechanical, 2. graphite

3. carbon dioxide, 4. a triangle

5. Earth's crust.

(B) Plants use nitrogen gas to form proteins.

(C) 1. Acid, 2. Oxide, 3. Salt, 4. Base

Alexandria Governorate

9 West Educational Zone

- 1 (A) 1. double covalent - single covalent
2. limestone - sedimentary
3. rushed back - inertia
4. big - small
- (B) 1. equal in 2. vibrating periodic
3. Nitrogen 4. rivers
- (C) Object's weight
= Mass \times Earth's gravitational acceleration
= $56 \times 10 = 560$ Newton
- 2 (A) 1. c 2. b 3. d 4. d
B) 1. (✓) 2. (✓) 3. (x) 4. (x)
- (C) $\text{NH}_3 + \text{HCl} \xrightarrow{\text{conc}} \text{NH}_4\text{Cl}$
- 3 (A) 1. Chemical reaction. 2. Bases
3. Mechanical waves 4. Lava
- (B) 1. Silver chloride (AgCl)
2. A train motion 3. Seas. 4. Granite
- (C) To reduce friction between moving parts of machines and prevent their erosion

- 4 (A) 1. H_2O 2. Sound waves
3. NH_4 4. Atmosphere
- (B) 1. e 2. c 3. b 4. d
- (C) 1. $\text{Ca}(\text{OH})_2$ 2. 4 atoms
3. $40 + (16 \times 2) + (1 \times 2) = 74$

10 Montazah Educational Zone

- 1 (A) 1. a 2. c 3. b 4. d
(B) 1. double covalent bond 2. Sedimentary
3. LiCl 4. monovalent
- (C) Object's weight
= Mass \times Earth's gravitational acceleration
= $90 \times 10 = 900$ Newton
- 2 (A) 1. valency 2. ionic bond
3. periodic motion 4. gneous rocks
5. Metals 6. Nitrogen gas
- (B) Mass of reactants = $12 + (16 \times 2) = 44$ gm
Mass of products = $12 + (16 \times 2) = 44$ gm

(C) Safety belts work on stopping the force of inertia to prevent driver and passengers from being injured when a sudden change in motion occurs

- 3 (A) 1. sedimentary 2. ozone
3. graphite 4. ^2MgO

(B)	Compound	Name	Type
1.	NaOH	Sodium hydroxide	Base
2.	CaO	Calcium oxide	Oxide
3.	HCl	Hydrochloric acid	Acid
4.	NaCl	Sodium chloride	Salt

(C) Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, where the speed of electromagnetic waves is much greater than the speed of mechanical waves.

- 4 (A) 1. The Earth's crust 2. The mantle
3. The outer core 4. The inner core

(B) 1. d 2. c 3. b 4. a

(C) It is used by green plants in photosynthesis process to form food for other living organisms including people

Qalyasbia Governorate

11 Official Lang. Sch. Administration

- 1 (A) 1. Chemical reaction 2. Relative motion
3. Positive ion. 4. Rock
- (B) 1. d 2. a 3. b 4. c

(C) Object's weight
= Mass \times Earth's gravitational acceleration
= $10 \times 9.8 = 98$ Newton

- 2 (A) 1. a 2. b 3. c 4. b
(B) 1. Carbon dioxide 2. biological force
3. Al_2O_3 4. ionic bond
- (C) Mass of reactants = $12 + (16 \times 2) = 44$ gm
Mass of products = $12 + (16 \times 2) = 44$ gm

- 3 (A) 1. Sulphate 2. Quartz
3. Liquids transferring 4. HNO_3
- (B) 1. Sandstone. 2. Argon.
3. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{conc}} \text{NH}_4\text{Cl}$
4. Basalt.



(C) The iron rod will change into a temporary magnet

- 1 (A) 1 mechanical electromagnetic
2 magma lava
3 Acids alkalis
4 ferrous ferric

(B) 1 (✓) 2 (x) 3 (✓) 4 (x)

(C) 1 (✓) 2 Nonmetal 3 Negative ion

El-Sharkia Governorate

12 10th of Ramadan Educational Zone

- 1 (A) 1 Acids 2 Relative motion
3 Marble 4 Magma

(B) 1 (✓) 2 (x) 3 (✓) 4 (x)

(C) The astronaut's mass remains constant, because the mass doesn't change from a place to another

- 2 (A) 1 carbon dioxide - oxygen
2 mechanical electromagnetic
3 Quartz - mica
4 ionic bond - triple covalent bond

(B) 1 c 2 d 3 b 4 c

(C) White clouds of ammonium chloride are formed



- 3 (A) 1 c 2 d 3 a 4 b

(B) 1 Mercury 2 solid
3 friction 4 crust

(C) Object's weight
= Mass \times Earth's gravitational acceleration
= $9 \times 10 = 90$ Newton

- 4 (A) 1 Fan motion 2 KOH
3 Ozone 4 HCl
(B) 1 Friction force 2 Valency
3 The outer core 4 Metamorphic rocks

(C) Mass of reactants = $12 + (16 \times 2) = 44$ gm.
Mass of products = $12 + (16 \times 2) = 44$ gm.

El-Gharbia Governorate

13 Science Inspectorate

- 1 (A) 1 a 2 a 3 c 4 b

(B) 1 HCl 2 Na_2CO_3
3 CaSO_4 4 Al_2O_3

(C) Because acids change the colour of litmus paper into red, while bases change the colour of litmus paper into blue

- 2 (A) 1 zero - completely filled
2 metals positive
3 kilogram - newton
4 transitional periods

(B) 1 Friction forces
2 A simple pendulum motion
3 Potassium
4 Silver chloride

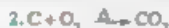
(C)

Ionic bond	Covalent bond
1 It is a bond between two atoms formed by the sharing and pairing of electrons.	1 It is a bond between two atoms formed by the sharing of electrons.
2 It is formed between two different elements.	2 It may be formed between two atoms of the same or different elements.
3 It is named like the electrical attraction between the positive and negative ions.	3 It is named like the sharing of electrons between the atoms.
4 It has one type.	4 It has three types (single, double and triple).
5 It produces compounds molecules only.	5 It produces elements and compounds molecules.

- 3 (A) 1 The atomic group.
2 Chemical reaction
3 Friction forces.
4 Speed

(B) 1 (x) 2 (✓) 3 (x) 4 (✓)

(C) When the electric current passes through the coil, the wrought iron bar turns into a temporary magnet.
It changes the electric energy into a magnetic energy.



- (B) 1. Base. 2. Acid. 3. Oxide. 4. Salt

(C) Object's weight

= Mass \times Earth's gravitational acceleration

$$\begin{aligned} \text{Mass} &= \frac{\text{Weight}}{\text{Earth's gravitational acceleration}} \\ &= \frac{980\text{N}}{9.8} = 100\text{ kg} \end{aligned}$$

Dakhla Governorate

14 Science Imperative

1 (A) 1. white ammonium chloride

2. weight - mass 3. Nitrogen - proteins.



- (B) 1. b. 2. b. 3. c. 4. c.

(C) The mass of ball (kg) = $20000 + 1000 = 20\text{ kg}$

- Object's weight

= Mass \times Earth's gravitational acceleration

= $20 \times 9.8 = 196\text{ Newton}$.

2 (A) 1. Positive ion. 2. Bases.

3. Periodic motion 4. Metamorphic rocks

- (B) 1. three 2. 10 electrons

3. friction force 4. Basalt

(C) $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} 2\text{CO}_2$

3 (A)	The odd word	The scientific name
	iron	Iron
	Sodium oxide	Sulfuric acid
	Sound waves	Heat - magnetic waves
	Oceans	Fresh water

- (B) 1. (✓) 2. (✓) 3. (x) 4. (✓)

(C) Because the sunlight is electromagnetic waves which can travel through space, while the sound of solar explosions is mechanical waves which can't travel through space

4 (A) 1. d. 2. c. 3. e. 4. a.

(B) 1. Type : metal atomic number : 11

2. a. Earth's crust b. The mantle

3. Because when the electric current passes through the coil, the wrought iron bar turn into a temporary magnet

- It changes the electric energy into a magnetic energy

4. Circular periodic motion

- (C) 1. Ag_3PO_4 2. Ag_2O 3. H_3PO_4

Suez Governorate

15 Science Imperative

1 (A) 1. ionic bond - triple covalent bond.

2. vibrating - circular

3. third - fourth

4. sedimentary igneous

- (B) 1. Silver chloride. 2. Sound waves.

3. Soil. 4. Lava.

(C) Object's weight

= Mass \times Earth's gravitational acceleration

= $100 \times 9.8 = 980\text{ Newton}$

2 (A) 1. b. 2. c. 3. a. 4. b.

- (B) 1. Basalt. 2. HCl 3. Train motion.

4. Carbon dioxide gas

- (C) 1. Base. 2. Oxide 3. Salt

3 (A) 1. positive ion. 2. sodium

3. friction force 4. metamorphic

- (B) 1. d. 2. c. 3. e. 4. b.

(C) Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves. Where the speed of electromagnetic waves is much greater than the speed of mechanical waves

4 (A) 1. (✓) 2. (x) 3. (x) 4. (x)

- (B) 1. Transitional motion 2. Rock

3. Metals 4. Nitrogen gas.



- Type of reaction: Combination of a compound with another compound.



Ismailia Governorate

16

1 (A) 1 igneous – sedimentary 2. Hailey – 76



4. periodic – transitional

(B) 1 Sodium chloride (NaCl)

2 It is used in making many devices such as electric winches and electric bells

3 Drone flyer

4 Nitrogen gas

(C) Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs

2 (A) 1 Magma, 2. Light year

3 Chemical reaction.

4 Friction force

(B) 1 sodium chloride molecule

2 365.25 days

3 the mantle

4. Newton



3 (A) 1 a 2. c 3. c 4. b

The odd word	The scientific term
1 $\text{Ca}(\text{OH})_2$	1 Oxides,
2 Sun	2 Planets
3 sand	3 Minerals forming granite
4 Sound waves	4 Electromagnetic waves

(C) The iron bar will change into a temporary magnet

4 A)

P.O.C	Metals	Nonmetals
1 heat conduction	They are good conductors of heat	They are bad conductors of heat

P.O.C	Acid	Base
2 The colour of litmus paper	They change the colour of litmus paper into red due to the presence of free positive hydrogen ions H^+	They change the colour of litmus paper into blue due to the presence of the negative hydroxide ions OH^-

P.O.C	Inner Core	Outer Core
Thickness	It extends to about 1350 km approximately	About 2100 km approximately

P.O.C	Mechanical waves	Electromagnetic waves
Transferring through space	They need a medium to transfer through as can travel through space	They spread in all directions in free space

(B) 1 (✓) 2 (✓) 3. (X) 4 (X)

(C) Metals 2 Positive ion 3 Division

Bekhera Governorate

17

1 (A) 1 a 2. b 3 a 4. c

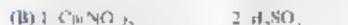
(B) Because the sunlight is electromagnetic waves, which can travel through space. while the sound of solar explosions is mechanical waves which can't travel through space

2 Because they are from heavy elements that descend towards the centre of the Earth due to its rotation around its centre.

(C) Granite 2 Marble

2 (A) 1 Lava 2 Periodic motion

3 Chemical reaction 4 Friction forces



(C) Mass of reactants = $2 + (16 \times 2) = 44 \text{ gm.}$

- Mass of products = $12 + (16 \times 2) = 44 \text{ gm}$

3 (A) 1 hydrogen – hydroxide

2 tropical – polar

3 Sandstone – 2 mm

4 third – 150 million

The odd word	The scientific terms
1 Solidification	1 kg x m/s ² = Newton's second law
2 A sample petroleum motion	Transitional motion

(C) Object's weight

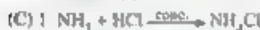
= Mass \times Earth's gravitational acceleration

$$\begin{aligned} \text{Mass} &= \frac{\text{Weight}}{\text{Earth's gravitational acceleration}} \\ &= \frac{280}{10} = 28 \text{ kg} \end{aligned}$$

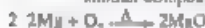
- 4 (A) 1 (x) 2 (x) 3 (✓) 4 (x)
(B) 1.



2 Ionic bond



Type : Combination of a compound with another compound



Type : Combination of a metal with a nonmetal

Mini Governorate

18 Science Inspectorate

- 1 (A) 1 c 2 b 3 d 4 d
(B) 1 heat 2. Volcanic igneous
3. sodium hydroxide 4. fourth
(C) This means that the amount of Earth's gravitational to this object is 30 newton

- 2 (A) 1 zero divalent 2 periodic transition.
3 Magma lava.
4 gravity = 150 million kilometres.

(B) The odd word	The scientific term
1 Sound waves	Electromagnetic waves.
2 Pollution	Characteristics of Earth has support the continuity of life
3 NaCl	Oxides
4 Jil vine	Minerals forming granite

- (C) Mass of reactants = $2(2 \times 1) + (2 \times 16)$
= 36 gm
Mass of products = $2[(2 \times 1) + 16]$
= 36 gm

- 3 (A) 1 The in 2 Electromagnetic waves
3 Bases. 4 Ozone layer

- (B) 1 Sulphur
2 Heart muscle contraction and relaxation
3 Pressure and high temperature
4 Nitrogen gas

- (C) Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

- 4 (A) 1 17 atoms 2 76 cm.Hg
3 18 elements 4. About 2885 km.
(B) 1 (✓) 2 (✓) 3 (✓) 4 (x)

- (C) White clouds of ammonium chloride are formed



Assist Governorate

19 Science Inspectorate

- 1 (A) 1 Iron 2. mechanical
3 carbon dioxide 4 NH_4Cl
(B) 1 It is used in making many devices such as electric winches and electric bells
2 Sodium hydroxide (NaOH)
3 Sandstone. 4 Carbon dioxide gas
(C) Object's weight
= Mass \times Earth's gravitational acceleration
 $10 \times 9.8 = 98$ Newton

- 2 (A) 1 c 2 c 3 b 4 b
(B) 1 c 2. b 3 c 4. a
(C) NaCl

- 3 (A) 1 Chemical reaction 2 Object's weight
3. Valency. 4. Ozone layer.
(B) 1 x. 2 (x) 3 (✓) 4 ✓
(C) Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs

- 4 (A) 1 periodic 2. Base 3. three 4. Oxygen
(B) 1 Na 2 Work
3 Basalt 4 Atmosphere
(C)

POA	Acids	Bases
The effect on litmus paper	They change the colour of litmus paper into red due to the presence of the positive hydrogen ions (H^+).	They change the colour of litmus paper into blue due to the presence of the negative hydroxide ions (OH^-).

Luxor Governorate

23

Luxor Governorate

1 (A) 1. c 2. a 3. b 4. a

(B) 1. Basin 2. periodic
3. limestone 4. Outer

(C) To reduce friction between moving parts of machines and prevent their erosion

2 (A) 1. trivalent - divalent.

2. mechanical - electromagnetic

3. mica - feldspar

4. Lava - volcanic

Answers of Final Examinations

(B) 1. (x) 2. (✓) 3. (✓) 4. (x)

(C) Fe_2O_3

3 (A) 1. Negative ion.

2. Metals

3. Inertia.

4. Ozone layer

(B) 1. 2CO_2

2. relaxation

3. inner core

4. Atmosphere

(C) The passengers will be rushed backward

4 (A) 1. c

2. a

3. b

4. c

(B) 1. silver chloride (AgCl).

2. Train motion

3. Basalt

4. Sandstone

(C) Name : Sodium phosphate

Type : Salt

Final Examinations

► Final Examinations of Some Governorates 2022.



Answer the following questions :

Question 1

A Choose the correct answer :

- During the chemical reaction $_{12}\text{Mg}$ loses its outer electrons and changes into
 a. Mg^+ b. Mg^- c. Mg^{+2} d. Mg^{-2}
- Passengers are rushed back when the car moves suddenly because of
 a. centrifugal force. b. gravitational force.
 c. force of inertia. d. friction force.
- If your car moves beside a stopping car, you imagine that the other car moves
 a. backwards. b. at a high speed.
 c. forwards but slowly. d. at the same speed.
- Earth locates in the position according to its distance from the Sun.
 a. third b. fourth c. fifth d. second

B What happens when ... ?

- An atom gains one electron or more.
- Burning of magnesium in the presence of oxygen.
- A proper force acts on a moving object in the same direction.

C Draw a labeled diagram to show the different layers of the Earth.

Question 2

A Write the scientific term of the following :

- A device that converts electric energy into mechanical energy.
- A gas in the atmosphere reduces the effect of oxygen gas during burning process.
- An effect that changes the object state from being static to motion or vice versa.
- The breaking of the existing bonds between the atoms of the molecules in the reactants forming new bonds in the products.

B Complete the following equations :

- + $\xrightarrow{\Delta}$ 2MgO
- + \longrightarrow 2NO_2

A Define each of the following :

1. The belt of wanderer asteroids.
2. Friction force.

D Show by a diagram how two atoms of oxygen ${}_8\text{O}^{16}$ are bonded to form oxygen molecule.

Question 3

A Complete the following sentences :

1. gas comprises 21% of the components of the Earth's atmosphere.
2. The is considered the follower of Earth.
3. All masses are attracted towards the Earth by a force known as
4. Metals have less than electrons in their outermost shell.

B Compare between Granite and Basalt in view of :

1. Colour.
2. Kind.

C What is meant by saying that ... ?

1. A certain gas is a noble (inert) one.
2. The weight of an object equals 30 Newton.
3. Marble is a metamorphic rock.

Question 4

A Put (✓) or (✗) :

1. In a chemical reaction, the sum of reactant masses is equal to the sum of product masses. ()
2. Ionic bond occurs between two non-metal atoms. ()
3. The sandstone has a smooth texture. ()
4. When an atom changes into an ion, the mass number remains without any change. ()

B Give reasons for each of the following :

1. The ozone layer in the atmosphere is very important.
2. The plant roots extend easily through the upper part of the Earth's crust.
3. ${}_{13}\text{Al}^{27}$ is trivalent.

C Calculate : The mass of an object if its weight is 280 Newton. Knowing that the Earth's gravitational acceleration is 10 m/sec^2 .

2 Cairo Governorate

Maadi Educational Zone

Answer the following questions :

Question 1

A Complete the following statements :

1. The nearest planet to the Sun is, while the farthest planet from the Sun is
2. The force of gravity between two objects depends on and
3. The motion of simple pendulum is motion, while the motion of train is motion.
4. Granite belongs to rocks, while marble belongs to rocks.

B In the reaction in front of you :



1. Complete the equation.
2. Mention the type of reaction.
3. What is the role of heat energy in this reaction.
4. Calculate the masses of reactants and products through the following reaction if you know that the mass of magnesium $\text{Mg} = 24$, the oxygen mass $\text{O} = 16$

C Give one use for :

1. Infrared rays.
2. Telescope.

Question 2

A Write the scientific term of each of the following :

1. Celestial bodies which are formed of head and tail.
2. A device changes the mechanical energy into electric energy.
3. A natural solid material that exists in the Earth's crust and consists of one mineral or a group of minerals.
4. A very hot thick liquid which exists underneath the Earth's crust.

B Compare between Inner planets and outer planets (two points only).

C Give reasons for :

1. Lubricating and oiling of mechanical machines.
2. The presence of a white colour surrounds the planet Earth.

Question 3

A Choose the correct answer :

- The celestial bodies that revolve between Mars and Jupiter are named
a. asteroids. b. comets, c. meteors, d. meteorites.
- All of the following are covalent molecules except
a. H_2O b. MgO c. HCl d. O_2
- is an example for mechanical waves.
a. Light waves b. Radio waves c. Sound waves d. Microwaves
- Bigger units of the universe are
a. planets. b. galaxies, c. stars. d. moons.

B Put (✓) or (x) :

- The valency of noble gases is monovalent. ()
- Crust is the outer layer of the Earth. ()
- The exerted work to lift an object increases by increasing the object's mass. ()
- Halley's comet completes one rotation around the Sun every 76 years. ()

C What is meant by ... ?

- The force.
- Law of constant ratios

Question 4

A Correct the underlined words ... ?

- Infrared rays are used in photographing bones for detecting bone fractures.
- Carbon oxides have bad effects on the nervous system and the eye.
- The mantle is a solid layer of Earth rich in iron and nickel.
- The dynamo changes the electric energy into magnetic energy.

B Choose from column (B) what is suitable for column (A) :

(A)	(B)
1. The atmospheric pressure on Earth	a. lava.
2. Earth's gravity	b. earth's crust.
3. An outer layer of 8-60 km thickness	c. helps the stability of the water and atmospheric layer.
4. It comes out from volcanic vent	d. is estimated by 76 cm mercury.

C Calculate : The distance in kilometer between two stars in the space, the distance between them is three light years.

3 Cairo Governorate

Elhailmia Official Language School

Answer the following questions :

Question 1

A Complete the following statements :

1. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc.}}$
2. The bond in sodium chloride molecule is bond, whereas the bond in oxygen molecule is
3. Electric motor changes energy into energy.
4. The car passengers are pushed when car stop suddenly by the effect of force

B Match from column (A) what suits it column (B) :

(A)	(B)
1. Milky way	a. is an example of metal oxides
2. Light waves	b. is an example of plutonic igneous rocks
3. Granite	c. is the galaxy that solar system belongs to
4. Aluminium oxide	d. is an example of sedimentary rocks
	e. is an example of electromagnetic waves

C Write the chemical formula of magnesium oxide.

Question 2

A Write the scientific term :

1. The distance covered by light in one year.
2. They are waves which need a medium to transfer through.
3. The number of electrons gained, lost or even shared during a chemical reaction.
4. It is an effect that attempts to change object's state from being static to motion or vice versa or attempts to change the motion direction.

B Correct the underlined words :

1. The symbol of the hydroxide atomic group is SO₄
2. The Earth occupies the fifth order according to the distance from the Sun.
3. The salts dissolve in water producing hydroxide negative ion.
4. Due to friction in machines, light energy is produced.

C Give a reason for : acids change the colour of litmus paper into red.

Question 3

A Put (✓) or (✗) in front of the following sentences :

1. By increasing the ratio of carbon dioxide in air, the Earth's temperature increases. ()
2. The wire of electromagnet made up of copper. ()
3. Microscopes are used for identifying the celestial bodies. ()
4. Car brakes depend on friction forces. ()

B From the electronic configuration :

1. Mention the kind of the element (Metal – Non-metal)
2. Mention its valency (Monovalent – Divalent – Trivalent)
3. In chemical reactions this element (loses – gains) electrons.
4. During a chemical reaction it gives (Positive ion – Negative ion)



C What happens when an atom of metal element loses an electron or more during the chemical reaction ?

Question 4

A Choose the correct answer

1. Marble is an example of rocks.
 - a. igneous
 - b. sedimentary
 - c. metamorphic
2. The valency of calcium (${}_{20}\text{Ca}$) is
 - a. monovalent.
 - b. divalent.
 - c. trivalent.
3. waves are used in making remote control sets.
 - a. Infrared
 - b. Radio
 - c. Ultraviolet
4. are eight spherical opaque bodies revolve around the Sun.
 - a. Planets
 - b. Meteors
 - c. Comets

B Identify the type of each of the following (acid - base - salt - oxide) :

1. CaO
2. $\text{Mg}(\text{OH})_2$
3. HNO_3
4. NaCl

C Calculate : The weight of an object if you know that the Earth's gravitational acceleration is 9.8 m/sec^2 and its mass is 10 kg.

4 Cairo Governorate

Rod El-Farag Educational Zone

Answer the following questions :

Question 1

A Complete the following statements :

1. The motion of simple pendulum is motion, while the motion of trains is motion.
2. The bond in sodium chloride molecule is bond, while the bond in water molecule is bond.
3. Limestone is from rocks, but marble is from rocks.
4. Electromagnet changes energy into energy.

B Compare between the following :

1. Granite and basalt (according to kind – minerals forming it)
2. Mechanical waves and electromagnetic waves (according to definition – speed).

C Calculate : The mass of an object its weight is 980 newton and the Earth's gravity is 9.8 m/sec^2 .

Question 2

A Choose the correct answer :

1. The normal atmospheric pressure equals cm.Hg.
a. 76 b. 67 c. 70 d. 72
2. The measuring unit of force is
a. newton. b. kilogram. c. metre/sec² d. metre/sec.
3. oxides are resulted during time of lightning.
a. Carbon b. Sulphur c. Fuel d. Nitrogen
4. The car brake is one of the applications of force.
a. inertia b. nuclear c. gravitational d. friction

B Give reasons for :

1. Policemen advice drivers to use safety belts in cars.
2. The valency of noble gases is zero.
3. The density of the outer planets is low.
4. We see lightning before hearing thunder.

A Complete the following equations :



Question 3

A Write the scientific term :

1. Number of electrons gained or lost or shared during chemical reaction.
2. It is a very hot thick (viscous) liquid underneath the Earth's crust.
3. Substance dissolves in water and gives negative hydroxide ion.
4. The motion which is regularly repeated at equal periods of time.

B Mention one example for :

- | | |
|----------------------|-----------------------------|
| 1. Mechanical waves. | 2. Acid. |
| 3. Inner planets. | 4. Salt dissolves in water. |

C Mention one importance of :

- | | |
|-------------------|--------------------------|
| 1. Infrared rays. | 2. Strong nuclear force. |
|-------------------|--------------------------|

Question 4

A Put (✓) or (✗) :

- | | |
|---|-----|
| 1. The water bodies represent about 50% of the Earth surface. | () |
| 2. Oxides are substances that dissociated in water producing H^+ ions. | () |
| 3. Inner core layer of Earth is rich in iron and Nickel. | () |
| 4. Lubricating and oiling reduce friction between moving parts. | () |

B Write the chemical formula for each of the following :

- | | |
|----------------------|----------------------|
| 1. Copper nitrate. | 2. Sulphuric acid. |
| 3. Sodium hydroxide. | 4. Calcium sulphate. |

C What happens when ... ?

1. Burning of coal and cellulose fibers.
2. The car stops suddenly.

5 Cairo Governorate

St. Joseph Maronite Language Schools

Answer the following questions :

Question 1

A Complete the following statements :

1. The types of telescopes are and
2. On dissolving acids in water, they give ions and on dissolving alkalis in water, they give ions.
3. The nearest planet to the Sun is, but is the biggest one in the solar system.
4. Granite is from rocks, but Limestone is from rocks.

B Mention the importance of :

- | | |
|--------------------|-------------------|
| 1. Electric motor. | 2. Infrared rays. |
| 3. X-rays. | 4. Visible light. |

C Calculate : The mass of an object that weighs 98 newton (knowing that the Earth's gravity = 9.8 m/s^2).

Question 2

A Give reasons for :

1. The valency of Nobel gases is zero.
2. We see lightning before hearing thunder.
3. The book remains static on the desk.
4. The presence of white colour surrounds the Earth.

B Correct the underlined words :

1. Bromine is the only liquid metal.
2. The Earth is the fourth planet according to the distance from the Sun.
3. Planets revolve around the Sun in circular paths.
4. Weak nuclear forces are used in producing electric energy.

C Calculate the mass of reactants and products in the following equation :



Question 3**A** Write the scientific term :

1. A bond resulting from the electric attraction between a positive ion and a negative ion.
2. Waves that don't need a medium to travel.
3. It is the change in an object position or direction as time passes relative to another object.
4. An instrument used to change mechanical energy to electric energy.

B Compare between :

1. Transitional motion and periodic motion.
2. Metals and non-metals.

C Define :

1. Light year.
2. Celestial bodies.

Question 4**A** Choose the correct answer :

1. All the following are metals except
 a. iron. b. oxygen. c. copper. d. sodium.
2. The biggest units of the universe are
 a. planets. b. stars. c. galaxies. d. moons.
3. Electromagnet is used in making
 a. calculator. b. electric bell. c. microscope. d. simple pendulum.
4. Car brakes are one of the applications of
 a. gravitational force. b. friction force. c. nuclear force. d. magnetic force.

B What happens when ... ?

1. A moving bus stops suddenly.
2. The air contains oxygen gas and is free of nitrogen gas.

C Write the chemical formula of :

1. Sodium hydroxide.
2. Sulphuric acid.

6 Cairo Governorate**Helwan Educational Zone**


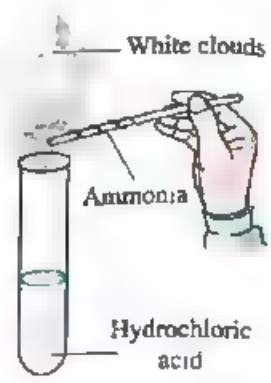
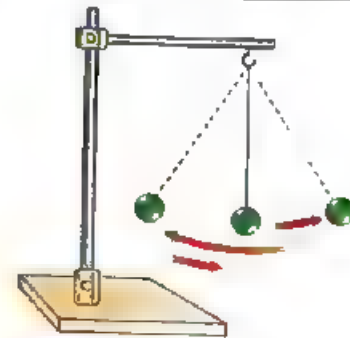
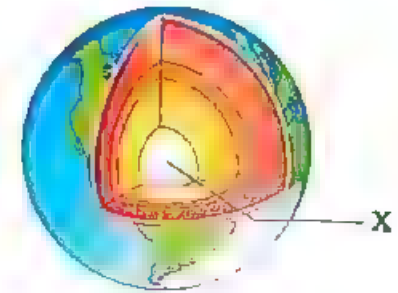
Answer the following questions :

Question 1**A** Write the scientific term of each of the following :

1. It is breaking the existing bonds between the reactant molecules and forming new bonds between the product molecules.
2. It is a change in position of an object over time relative to a reference point.

3. They are the small rocky masses that burn completely when penetrate the atmosphere.
4. It is an atom that has gained one electron or more during the chemical reactions.

B Give reasons for :

<p>1.</p>  <p>Mention the importance of this tool.</p>	<p>2.</p>  <p>Write the chemical equation of this reaction.</p>
<p>3.</p>  <p>What is the type of motion in this object ?</p>	<p>4.</p>  <p>Mention the metals which found in (X) layer.</p>

C Give a reason for : we see lightning before hearing the thunder.

Question **2**

A Choose the odd word out :

1. Na_2O – CuO – H_2SO_4 – Fe_2O_3 .
2. Prevents feet from slipping – Stopping car's motion – Starting car's motion – Erosion of machine parts.
3. Mercury – Jupiter – Saturn – Uranus.
4. $_{17}\text{Cl}$ – $_{12}\text{Mg}$ – $_8\text{O}$ – $_{15}\text{P}$

B Complete the following statements :

1. The chemical formula of calcium sulphate is
2. forces are used in producing electric energy.
3. is the most famous comet revolve around the Sun.
4. The valency of neon atom ($_{10}\text{Ne}$) is

- Someone of geologists examination a sample of granite's rock, found that its colour is pink. Explain another properties of this rock and show its minerals forming it.

Question 3

- A Choose the correct answer :

- The chemical bond in sodium chloride molecule is
a. ionic. b. single covalent. c. double covalent. d. triple covalent.
- From the examples of force inside living systems is
a. pulse. b. heart muscle contraction.
c. relaxation of muscles to move. d. all the previous.
- consists of mineral calcite.
a. Basalt b. Limestone c. Sandstone d. Marble
- Increasing of gas causes rising in the air's temperature.
a. CO b. NO₂ c. CO₂ d. SO₃

- B Choose from column (B) what suits it in column (A) :

(A)	(B)
1. NaOH	a. is the value of atmospheric pressure on Earth.
2. Gamma rays	b. affects the nervous system.
3. 76 cm Hg	c. is the greatest unit that form the universe.
4. Galaxy	d. are used in treatment and detecting some tumors. e. changes the colour of litmus into blue.

- C What happens when an object moves far away from the Earth's surface (according to its weight and mass) ?

Question 4

- A Put (✓) or (x), then correct the wrong ones :

- When 48g magnesium is reacted with 32g oxygen, 80g magnesium oxide is formed. ()
- Bus passengers are rushed forward once it suddenly stops due to gravity force. ()
- Earth occupies the fourth order ascendingly regarding the volume in solar system's planets. ()
- Dynamo converts the electric energy into mechanical energy. ()

- B Correct the underlined words :

- Non-metals are good conductors of heat and electricity.
- There are two moons revolve around Venus planet.
- Ultraviolet rays are used in cooking food since it has a heat effect.
- Lead iodide from salts that dissolves in water.

- C** Some people burn coal and cellulose fibers such as paper and cigarettes. In your opinion this is good or bad behavior ? And explain why ?

7 Giza Governorate

North Giza Educational Zone

Answer the following questions :

Question 1

- A** Put (✓) or (✗), then correct the wrong ones :

1. Passengers are rushed backward when the moving car stops suddenly. ()
2. Water covers about 50% of the Earth's surface. ()
3. Sodium is monovalent and magnesium is divalent. ()
4. The outermost energy levels of non-metals contains 5, 6, 7 electrons. ()

- B** Match :

(A)	(B)
1. The chemical formula of sodium sulphate	a. electromagnetic wave.
2. Sound	b. NaCl
3. Light	c. mechanical wave.
4. Oxygen gas	d. about 21% of the air volume.
	e. Na_2SO_4

- C** Write the electronic configuration and valency for ?

1. $^{24}_{12}\text{Mg}$
2. $^{35}_{17}\text{Cl}$

Question 2

- A** Write the scientific term :

1. A set of chemical formulae and symbols expressing the reactants, the products and the reaction conditions.
2. The motion which is regularly repeated at equal intervals of time.
3. The gas which acts as greenhouse effect.
4. A system that consists of thousands of millions of stars.

- B** Cross the odd word out :

1. NaCl – MgCl_2 – HCl – Na_2SO_4
2. Oxygen – Nitrogen – Chlorine – Sodium.
3. Light waves – Sound waves – Microwaves – Radio waves.
4. Mercury – Venus – Jupiter – Mars.

- C** Give a reason for : Policemen advice drivers to use safety belts in cars.

Question 3

A Complete the following :

1. The only liquid metal is while the only liquid non-metal is
2. Waves are divided into two types which are and
3. $\text{NH}_3 + \text{HCl} \longrightarrow \dots\dots\dots$
4. The nearest planet to the Sun is and the farthest one from the Sun is

B Write one use of :

- | | |
|------------------------|-----------------------|
| 1. Infrared rays | 2. Telescope |
| 3. X-rays | 4. Nitrogen gas |

C Calculate : The mass of an object that its weight is 980 N and the Earth's gravitational acceleration = 9.8 m/sec^2

Question 4

A Choose the correct answer :

1. oxides are resulted during time of lightning.
a. Carbon b. Sulphur c. Nitrogen
2. is a metamorphic rock.
a. Marble b. Sandstone c. Granite
3. The outer layer of Earth is the
a. crust. b. mantle. c. core.
4. The biggest unit of universe is
a. galaxies. b. planets. c. Sun.

B Compare between each of the following :

1. Crust and mantle related to (thickness).
2. Acids and Bases (the colour of litmus paper).
3. Weak nuclear force and strong nuclear force related to (one use only for each).
4. Electric generator and electric motor (conversion of energy).

C What happens when an atom loses one electron or more ?

Answer the following questions :

Question 1

A Complete the following statements :

1. The bond in the magnesium oxide is while the bond in the water molecule is
2. The object weight increases as the distance from the center of the Earth . . .
3. The sound wave is while the light wave is
4. Granite is igneous rock, while the basalt is igneous rock.
5. The biggest planet in volume is and the highest one in density is
6. Electric motor changes the energy to energy.
7. The valence of argon gas is, while the valence of mercury is

B Write a chemical formula :

Sulphuric acid – Calcium hydroxide – Sodium carbonate – Aluminium hydroxide
– Ammonium nitrate.

C Calculate : the weight of object, when its mass is 700 kg (knowing that the Earth gravity is 9.8 m/sec^2)

Question 2

A Write the scientific term :

1. Motion which is repeated regularly in equal periods of time.
2. An atom of element that does not lose or gain any electron in normal condition.
3. Solidified mass of gas, ice, rock, revolve around Sun.
4. Breaking down the bond between atom of reactant to form product.
5. Oxides that cause building corrosion.
6. An object position changes as time passes from initial position to final one.

B Give example :

Salt dissolves in water – acid – Non-metal oxide – Biological force.

C Compare between :

1. Meteors – Meteorites (definition).
2. Acids – Bases (definition).

Question 3

A Calculate the total mass of reactants and products :



B Choose the correct answer :

- The oxides are resulted during lightning.
a. carbon b. nitrogen c. sulphur
- The car brakes performance is an application of force.
a. attraction b. friction c. inertia
- Planets revolve around Sun in path,
a. circular b. elliptical c. spiral
- There is a triple covalent bond in
a. nitrogen. b. oxygen. c. water.
- All the following are bad conductors of electricity except ..
a. bromine. b. graphite. c. iodine.

C What happens when ... ?

- Approaching a wet rod with hydrochloric acid to ammonia.
- A bird migrates from north pole to equator (concerning mass & weight).
- Small rocks penetrates Earth's atmosphere.
- Burning of magnesium ribbon.

Question 4

A Correct underlined words :

- Mass of an object is the ability of Earth attraction to object.
- Sulphur oxide has greenhouse effect.
- The Earth locates in the fifth position according to distance from the Sun.
- The motion of pendulum is circular.

B Give a reason for :

- When atom loses one or more electron, it becomes positive ion.
- Car tyres are covered by a coarse substance.
- We see lightning before hearing thunder.
- Presence of life on Earth's surface.

C Write a function :

Friction - Telescope - Ultraviolet - Ozone layer.

Answer the following questions :

Question 1

A Complete the following statements :

1. The bond in sodium chloride is bond, whereas the bonds in water molecule are bonds
2. The nearest planet to the Sun is, while the farthest planet from the Sun is
3. The motion of simple pendulum is motion, while the motion of the train is motion.
4. Granite belongs to rocks, while marble belongs to rocks.

B Put (✓) or (x) :

1. Halley's comet completes one rotation around the Earth every 76 years. ()
2. Egypt seeks to use nuclear energy in producing electricity. ()
3. Crust is the outer layer of the Earth. ()
4. Gamma rays are used in photographic bones. ()

C Calculate : The weight of 20 kg of an object. Knowing that the Earth's gravitational acceleration is 9.8 m/s^2 .

Question 2

A Write the scientific term :

1. It is an effect tries to change the object from static to motion or vice versa.
2. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
3. They are waves used in remote sets.
4. They are the greatest unit that form the universe.

B Choose from column (B) what suits it in column (A) :

(A) Type of reaction	(B) Symbolic equation
1. Combination of a metal with a non-metal	a. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc.}} \text{NH}_4\text{Cl}$
2. Combination of an element with a compound.	b. $2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO}$
3. Combination of a compound with another compound	c. $\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$
4. Combination of a non-metal with a non-metal	d. $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} 2\text{CO}_2$

C Give one difference between electric generator and electric motor.

Question 3

A Choose the correct answer :

- Which of the following planets has the smallest gravity on its surface ? ..
 a. Mars. b. Mercury. c. Venus. d. Earth.
- The speed of light waves in space is the speed of radio waves.
 a. less than b. more than c. equal to d. no correct answer
- The normal atmospheric pressure equals cm.Hg.
 a. 76 b. 86 c. 70 d. 60
- The objects fall down by the effect of
 a. electromagnetic force. b. gravitational force.
 c. nuclear force. d. magnetic force.

B Give an example of :

- A circular motion.
- Sedimentary rock.
- Insoluble salt.
- Planet has a life.

C Give a reason for : the car passengers are rushed forward when the moving car stops suddenly.

Question 4

A Correct the underlined word :

- Pendulum motion is a type of wave motion.
- The Earth is the first planet according to the distance from the Sun.
- The distance between celestial bodies in space is large and measured in km.
- Burning of coal and cellulose fibers cause greenhouse effect.

B Write the chemical formula of the following compounds :

- Sulphuric acid.
- Copper nitrate.
- Ammonium chloride.
- Sodium carbonate.

C Calculate the total mass of reactants and products in the following reaction :



Answer the following questions :

Question 1

A Complete the following statements :

1. The bond in sodium chloride compound is bond but the bond in oxygen molecule is bond.
2. The chemical formula of water is but the chemical formula of nitric acid is
3. Waves are divided into two types which are waves and waves.
4. Basalt is from rocks but sandstone is from rocks.

B Correct underline words :

1. Sulphur oxides resulted at the time of lightning and they affect the nervous system.
2. X-rays are used in sterilizing sets of surgical operations rooms.
3. The car brake performance is an application of forces of inertia.
4. Mantle layer lies below the Earth's core.

C What happens when we place a wetted glass rod with hydrochloric acid close to the opening of a test tube containing ammonia solution ?

Question 2

A Write the scientific term :

1. The number of electrons gained, lost or even shared by an atom during a chemical reaction.
2. It is an atom that loses one electron or more.
3. The Earth attraction force to an object
4. The distance covered by light in one year,

B Give an example showing each of the following :

1. A trivalent atomic group.
2. A non-metal that has more than one valency.
3. A type of nuclear force used in scientific research.
4. A metamorphic rock.

C Problem : Calculate the weight of an object if its mass is 10 kg knowing that the Earth's gravity acceleration is 9.8 m/sec^2

Question 3

1 Choose the correct answer :

- 1 All of the following are metals except
 a. iron. b. oxygen. c. copper. d. sodium.
- 2 The chemical formula of bicarbonate group is
 a. $(\text{HCO}_3)^-$ b. CO c. CO_2 d. $(\text{CO}_3)^{-2}$
- 3 All of the following are periodic motion except
 a. fan motion. b. pendulum motion. c. car motion. d. sunflower motion.
- 4 The farthest planet from the Sun is
 a. Mercury. b. Venus. c. Neptune. d. Mars.

2 Choose the odd word out :

- 1 $\text{NaOH} - \text{KOH} - \text{HCl} - \text{Ca}(\text{OH})_2$.
- 2 $\text{Na}_2\text{O} - \text{CaO} - \text{MgO} - \text{NaCl}$.
- 3 Mercury - Jupiter - Saturn - Uranus.
- 4 Atmosphere - Hydrosphere - The gravity - Pollution.

3 Write the difference between electric generator and electric motor (according to changing of energy).

Question 4

1 Put (✓) or (x), then correct the wrong ones :

- 1 When the car stops suddenly passengers are rushed backward. ()
- 2 Meteors burn completely as they penetrate the atmosphere. ()
- 3 The biggest planet in the solar system is Jupiter. ()
- 4 Water bodies on the Earth's surface represent 50%. ()

2 Write one benefit of the following :

1. Chemical reactions. 2. Safety belts in cars.
3. Friction force. 4. Carbon dioxide gas.

3 Give a reason for : chemical equation should be balanced.

11 Alexandria Governorate

Science Inspectorate

Answer the following questions :

Question 1

A Complete the following statements :

1. $\text{NH}_3 + \text{HCl} \longrightarrow \dots\dots\dots$
2. X-rays are used in photographing $\dots\dots\dots$ at medical centers.
3. The rocky belt which separates between Mars and Jupiter is called $\dots\dots\dots$
4. The Earth's inner core is rich in $\dots\dots\dots$

B Mention one example for :

1. A non-metal with good electric conductivity.
2. A base.
3. The forces inside living systems.
4. The mechanical waves.

C Give a reason for : policemen advise drivers to use safety belts in cars.

Question 2

A Write down the electronic configuration for the following elements ${}_8\text{X}$ and ${}_{13}\text{Y}$ then complete the following statements :

1. The element $\dots\dots\dots$ is solid and shiny but element $\dots\dots\dots$ is divalent.
2. The type of ion in element ${}_8\text{X}$ is $\dots\dots\dots$, while in ${}_{13}\text{Y}$ is $\dots\dots\dots$
3. The name of bond which is formed between X and Y atoms is $\dots\dots\dots$
4. The name of bond formed between two atoms of X is $\dots\dots\dots$

B Write the scientific term for the following :

1. Breaking of bonds in the reactants molecules to form new ones in the products
2. It is an effect that changes the object phase from static to motion or vice versa, or changes the motion direction.
3. Solidified masses of ice, gases and rock pieces revolving around the Sun.
4. The distance covered by light in one year.

C If the Earth's gravity acceleration in a place is 9.8 m/s^2 find the mass of a body its weight is 100 newton.

Question 3

A Choose the correct answer :

- In the following chemical equation : $2\text{CO} + \text{O}_2 \xrightarrow{\Delta} 2\text{CO}_2$ the mass of reactants is 80 gm, so the mass of products is gm.
a. 40 b. 80 c. 160 d. 320
- Which of the following is considered an example of transitional motion
a. pendulum. b. water waves. c. train. d. moon.
- From the example of metamorphic rocks is
a. marble. b. limestone. c. sandstone. d. basalt.
- The planet with the highest gravity is
a. Venus. b. Earth. c. Mars. d. Jupiter.

B Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Electromagnet	a. used in night vision sets or remote sensing instruments.
2. Infrared	b. used to see celestial bodies.
3. Ozone layer	c. used in making electric bells and cranes.
4. Telescope	d. protects the Earth from harmful ultraviolet radiation.

C Compare between : the strong nuclear force and the weak nuclear force (regarding to usage).

Question 4

A Complete the following table :

Name of compound	Chemical formula	Number of atoms in the molecule	Number of elements in the molecule	The type of compound
Calcium Sulphate	(1)	(2)	(3)	(4)
(5)	MgO	(6)	(7)	(8)

B Correct the underlined words :

- The outer planets have high density.
- Green plants use nitrogen gas in photosynthesis process.
- Granite is an example of sedimentary rocks.
- The second layer of Earth is the outer core.

C What happens when mechanical machines are not lubricated or oiled.

12 Alexandria Governorate

El-Agamy Educational Zone

Answer the following questions :

Question 1

A Choose the correct answer :

- All the following are periodic motions except the motion.
a. pendulum b. fan c. train d. sunflower
- The isolated coil in electromagnet made of
a. copper. b. mercury. c. iron. d. magnet.
- The chemical formula of carbonate group is
a. CO b. CO₂ c. (HCO₃)⁻ d. (CO₃)⁻
- Planets revolve around the Sun in paths.
a. circular b. elliptical c. spiral d. zigzag
- The mass of an object, its weight is 98 newton =
(Earth's gravitational acceleration = 9.8 m/s²).
a. 10 kg b. 980 kg c. 0.98 kg d. 98 kg
- is a sedimentary rock.
a. Granite b. Basalt c. Marble d. Sandstone

B Compare between :

- The inner and outer planets, (according to : the distance from the Sun – size).
- Metals and non-metals, (According to : metallic luster – number of electrons in outer shell)

Question 2

A Write the scientific term :

- Small rocky masses that burn up completely due to the friction with the Earth's atmosphere.
- The device changes the mechanical energy into electric energy.
- The number of electrons gained or lost or even shared by an atom during the chemical reaction.
- The largest planet in the solar system.
- The gas that causes the greenhouse effect.
- Rocks are formed from magma or lava.

D Identify the type of the following compounds :



E Give reasons for the following :

1. The presence of the life on the surface of Earth planet only.
2. We see the lightning before hearing the thunder.

Question 3

A Put (✓) or (✗) :

1. The bond between two atoms of nitrogen is a triple covalent bond. ()
2. The lute is a pneumatic instrument. ()
3. The mantle layer lies beneath the Earth's outer core. ()
4. The chemical formula of sodium chloride is NaCl . ()
5. Ionic bond is a bond that occurs between metals and non-metal atoms. ()
6. The distance between stars is measured by km. ()

B Mention one application or (use) for :

1. Infrared.
2. Weak nuclear force.
3. Electromagnet.
4. Gamma rays.

C Identify the following atoms then answer the following questions :



1. The type of each atom (metal – non-metal – Noble gas)
2. The bond between two atoms of oxygen is bond.
3. The bond between magnesium atom and oxygen atom is bond.
4. The valency of ${}_{12}\text{Mg}$ is

Question 4

A Give an example :

1. Metamorphic rocks.
2. Positive atomic group.
3. Mechanical waves.
4. Gas reduces the effect of oxygen during the burning process.
5. Non-metal oxide.
6. Stringed instrument.

B Write the chemical formula for each of the following :

1. Calcium carbonate.
2. Aluminium oxide.

C What happens when ... ?

1. An atom loses one electron or more.
2. A car at rest suddenly moves forward (concerning to the passengers).

13 Alexandria Governorate

El-Montazah Educational Zone

Answer the following questions :

Question 1

A Put (✓) or (✗), then correct the wrong ones :

1. The bond between two atoms of nitrogen is a triple covalent bond ()
2. The violin is a pneumatic instrument. ()
3. The mantle layer lies beneath the Earth's outer core. ()
4. The chemical formula of sodium chloride is NaCl. ()
5. The distance between stars is measured by km. ()

B Identify the following atoms then answer the following questions :

- a. ${}_8\text{O}$ b. ${}_{12}\text{Mg}$

1. The type of each atom (metal – non-metal – Noble gas).
2. The bond between magnesium atom and oxygen atom . bond.

Question 2

A Choose the correct answer :

1. From the periodic motions the motion.
 - a. pendulum b. car c. train d. person
2. The isolated coil in electromagnet made of
 - a. copper. b. mercury. c. iron. d. magnet.
3. The chemical formula of carbonate group is
 - a. CO b. CO₂ c. (HCO₃)⁻ d. (CO₃)⁻⁻
4. is a sedimentary rock.
 - a. Granite b. Basalt c. Marble d. Sandstone
5. The planets revolve around the Sun in paths.
 - a. circular b. elliptical c. zigzag d. spiral

① Compare between :

The inner and outer planets. (According to : the distance from the Sun – size).

② Find the weight of an object its mass = 98 kg. (gravitational acceleration) = 10 m/s^2

Question 3

① Give an example :

1. Metamorphic rocks.
2. Mechanical waves.
3. Non-metal oxide.
4. Positive atomic group.
5. Gas reduces the effect of oxygen during the burning process.
6. Comet.

② Write the chemical formula for each of the following :

1. Calcium carbonate.
2. Sodium hydroxide.

③ What happens when ... ?

1. An atom loses one electron or more.
2. A car at rest suddenly moves forward (concerning the passengers).

Question 4

① Write the scientific term :

1. Small rocky masses that burn up completely due to the friction with air.
2. The device changes the mechanical energy into electric energy.
3. The number of electrons gained or lost or even shared by an atom during the chemical reaction.
4. Oxides that cause building corrosion.
5. Rocks are formed from magma or lava

② Identify the type of the following compound :

1. H_2SO_4
2. MgO

③ Give a reason for the following :

The presence of life on the surface of Earth's planet only. (2 reasons)

14 Al-Qalyoubia Governorate

Shoubra El-Khima Educational Zone

Answer the following questions :

Question 1

A Complete the following statements :

- is used to change the mechanical energy into electric energy.
- The valency of noble gases is as their outermost shells are with electrons.
- is a dark coloured rock while is a pink or gray coloured rock.
- During the formation of MgO molecule atom loses electrons, which are gained by atom.
- Types of telescopes are and
- rays are used in the remote sets, while rays used for detecting bone fractures.

B Write the chemical formula :

- Aluminium oxide.
- Potassium carbonate.
- Sulphuric acid.
- Sodium hydroxide.

C Write the balanced chemical equation for each of the following reactions :

- Reaction between hydrogen and chlorine.
- Reaction between nitrogen monoxide with oxygen.

Question 2

A Choose the correct answer :

- All the following are examples of periodic motion except the motion.
a. Fan b. bicycle c. pendulum d. wave
- The substances resulted from burning of coal and cellulose fibers cause
a. headache. b. fainting. c. lung cancer. d. all the previous.
- The distance covered by light in one year = km.
a. 9.467×10^{12} b. 6.497×10^{12} c. 7.496×10^{12} d. 4.769×10^{12}
- The metamorphic rocks are produced as a result of the effect of on rocks.
a. high temperature b. high pressure c. (a) and (b) d. no correct answer
- waves are example of mechanical waves.
a. Water b. Light c. Radio d. Ultraviolet

11 Compare between acids and bases related to their :

1. Dissociation in water.

2. Effect on litmus paper.

12 The weight of an object on Mars planet is 32 newton and on Earth is 80 newton, what's the gravity acceleration on Mars if the gravity acceleration on Earth is 10 m/s^2 ?

Question 3

A Write the scientific term :

1. The number of electrons that an atom gains, loses or even shares during a chemical reaction.
2. The reactions which involve a combination of two substances to form a new compound.
3. It is an effect attempts to change the object's phase from being static to motion or vice versa.
4. They are rocks formed by solidification of the magma underneath the Earth's crust or lava on the Earth's surface.
5. It is a region separates the group of the inner planets from the group of the outer planets.
6. Resistant forces originate between the object in its motion and the medium touching them.

B Give reasons for :

1. We see lightning before hearing thunder.
2. The density of outer planets is low.
3. The bond in an oxygen molecule is a double covalent bond.

C Calculate the mass of oxygen that reacts with 12 gm of carbon to form 44 gm of carbon dioxide according to the following equation $\text{C} + \text{O}_2 \longrightarrow \text{CO}_2$

Question 4

A Two elements (x) and (y) have atomic number (11) and (17) respectively :

1. Show by drawing how the chemical bond is formed between them.
2. What is the type of this bond ?

B What happens when ... ?

1. Approaching a wet rod with hydrochloric acid to ammonia gas (write the equation).
2. The passengers don't use the safety belts in cars.

C Correct the underlined words :

1. Kilogram is the measuring unit of weight.
2. The common name of sodium hydroxide is table salt.
3. The molecule of inert gas is diatomic.
4. Granite consists of olivine, pyroxene and feldspar.
5. The motion of simple pendulum is an example of wave motion.
6. Negative ions have number of energy levels less than that in their atoms.

Answer the following questions :

Question 1

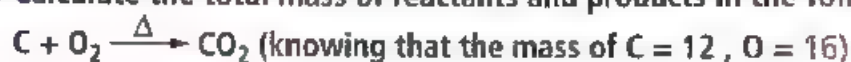
A Write the scientific term :

1. An atom that has lost an electron or more during chemical reactions.
2. Force responsible for steadfastness of the hydrosphere position on Earth's crust.
3. A type of chemical bonds which produce elements or compounds.
4. An effect attempts to change the object state from being static to motion or vice versa.

B Complete the following table :

1. Chemical formula for sodium sulphate	.....
2. Application on	safety belts.
3. Application on	car brakes.
4. Chemical formula of calcium nitrate	.....

C Calculate the total mass of reactants and products in the following reaction :



Question 2

A Complete the following sentences :

1. The chemical bond in nitrogen molecule is while in sodium chloride molecule is
2. Electromagnet is used in many devices such as and
3. The nearest planet to the Sun is and the farthest one from the Sun is
4. Nitrogen oxides affect system while sulphur oxides affect system.

B Write the numbers refers to :

1. 6386 km.
2. 8 electrons.
3. 76 cm Hg.
4. 118

C Give reasons for :

1. We can see sunlight, but we don't hear the sound of solar explosions.
2. The car passengers are rushed forward when the car stops suddenly.

Question 3**A Choose the correct answer :**

- salt dissolves in water.
a. K_2SO_4 b. PbI_2 c. $AgCl$ d. $PbSO_4$
- is example of sedimentary rocks.
a. Granite b. Basalt c. Sandstone d. Marble
- Sodium hydroxide molecule is considered
a. an acid. b. a base. c. an oxide. d. a salt.
- Lubricating and oiling mechanical machines depend on decreasing the effect of force.
a. inertia b. friction c. attraction d. electromagnetic

B Cross odd word out :

- Gravitational force – biological force – electromagnetic force – nuclear force.
- $Na_2O - Al_2O_3 - SO_3 - MgCl_2$
- Light waves – Sound waves – Micro waves – Radiowaves.
- Sodium – Oxygen – Nitrogen – Chlorine.

C Give one importance of the following :

- Ozone gas.
- Nitrogen gas.

Question 4**A Put (✓) or (✗), then correct the wrong ones :**

- Hydrochloric acid changes the colour of litmus paper into blue. ()
- Wanderer asteroid belt lies between Mars and Jupiter. ()
- Valency of an element which atomic number 20 is trivalent. ()
- X-rays used to detect the sites of bone fractures. ()

B Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Caustic soda	a. used in identifying the celestial bodies
2. Telescopes	b. $Ca(OH)_2$
3. Limewater	c. used in medicine and industry
4. Weak nuclear force	d. $NaOH$

C Compare between (2 points only) :

Inner planets group and outer planets group.

Answer the following questions :

Question 1

A Complete the following statements :

1. Oxides are resulted from the combination between ... and ...
2. The nearest planet to the Sun is ... and the farthest planet is ...
3. Bond in a molecule of sodium chloride is ... while in a molecule of oxygen is ...
4. The only liquid metallic element is ... and non-metal element liquid is ...

B Write the scientific name for the following compounds :

1. H_2SO_4
2. CaCO_3
3. NH_4OH

Question 2

A Give reasons for the following :

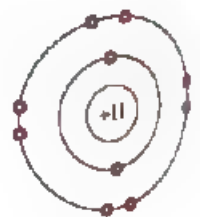
1. The importance of gravity of the Earth.
2. The outer planets have low densities.
3. Acids solutions change blue litmus paper into red.
4. The use of oils and lubricants in mechanical devices.

B Correct the underlined words :

1. The summation of mass of reactants is larger than that of products.
2. Planets are characterized by the presence of asteroids revolving around them.
3. Granite rock is composed of olivine, pyroxene and feldspar minerals.
4. The electroic motor is used in making cranes and electric bell.

C Study the figure and then complete the following :

1. Type of ion
2. The valency



Question 3

A Put (✓) or (x) :

1. Mantle layer is located between the Earth's core and crust. ()
2. Friction force is a force between the moving object and the medium which moves in. ()
3. Igneous rocks are formed in three stages which are disintegration, transportation and deposition. ()
4. Pollution with sulphur oxides affect the nervous system and the eye. ()
5. Forming white clouds when exposing a wet glass rod of HCl with a tube of solution of ammonia. ()
6. Weight of an object decreases with increasing its mass. ()

B What happens when ... ?

1. Stopping the car suddenly, when moving very quickly.
2. Old rocks are subjected to high heat, pressure or both of them.
3. The ratio of carbon dioxide gas in air increases.
4. Burning of magnesium ribbon in air.

Question 4

A Write the scientific term for each of the following phrases :

1. The atom lost or gained one or more electrons during chemical reaction.
2. The distance that covered by light in a year.
3. External effect is trying to change the body's state of rest to movement or vice versa, or trying to change the direction of the body.
4. A group of atoms of different elements associated with each other and behave as a single atom in chemical reactions.
5. Rocks which are formed of molten materials after solidification.
6. Waves need a material medium to transfer through.

B Write one use for each of the following :

- | | |
|---------------------------|------------------------|
| 1. Gamma rays. | 2. Sound waves. |
| 3. Strong nuclear forces. | 4. Chemical reactions. |

Answer the following questions :

Question 1

A Complete the following statements :

1. is the only liquid metallic element, while is the only liquid nonmetallic element.
2. Electromagnet is made by the idea of changing energy into energy.
3. The bond in a hydrogen molecule is a bond, while the bond in nitrogen molecule is a bond.
4. Granite is from igneous rocks, while basalt is from igneous rocks.

B Mention one example :

- | | |
|-----------------------------------|------------------------------|
| 1. Pneumatic musical instruments. | 2. Metamorphic rocks. |
| 3. Wave periodic motion. | 4. A trivalent atomic group. |

C Write the balanced chemical equation representing the following :

1. Heating a magnesium ribbon in the air.
2. Hydrochloric acid is combined with ammonia gas.

Question 2

A Write the scientific term of the following :

1. Elements, their valencies are zero.
2. A technological application is used in cars and planes to stop the forces of inertia when a sudden change in motion occurs.
3. Oxides are produced due to a combination of oxygen with a metal.
4. The region which separates the inner and outer planets.

B Choose the odd word out, then write the scientific term of others :

1. Lithium / Silver / Aluminium / Sodium.
2. Mercury / Venus / Earth / Mars.
3. Gravitational forces / Friction forces / Nuclear forces / Electromagnetic forces.
4. $^{20}_{19}\text{Ca}$ / $^{39}_{19}\text{K}$ / $^{35}_{17}\text{Cl}$ / $^{23}_{11}\text{Na}$

C If the Earth's gravitational acceleration in a place is 10 m/sec^2 Calculate the weight of an object if its mass is 28 kg.

1. Carbon dioxide have bad effects on the nervous system and the eye. ()
2. The Earth is the third planet according to the distance from the Sun. ()
3. Gamma rays are used in photographing bones. ()
4. The mass of a molecule of (NO_2) is more than the mass of a molecule of (NO). ()

1. Elements in aluminium hydroxide.
2. The thickness of the mantle layer.
3. The percentage of nitrogen gas in the atmospheric air.
4. Atoms in magnesium nitrate.

1. Blood is pumped all over the body organs.
2. We see lightning before hearing thunder although they occur at the same time.

Question 4

- The car brake performance is an application of
 - gravitational force.
 - friction force.
 - centrifugal forces.
 - forces of inertia.
- The distance covered by light in two years equals km.
 - 9.467×10^{12}
 - 9.467×10^{16}
 - 18.934×10^{12}
 - 18.934×10^6
- Ozone layer protects life on the Earth by absorbing rays.
 - Infrared
 - visible
 - gamma
 - ultraviolet
- is produced from the conversion of limestone.
 - Granite
 - Marble
 - Basalt
 - Sandstone

1. Acids – bases (according to : the effect on litmus paper).
2. Electric generator – electric motor (according to : iden of operation).
3. Outer planets – Inner planets (according to : density).
4. Train motion – simple pendulum motion (according to : type of motion).

$$\text{C} + \text{O}_2 \xrightarrow{\Delta} \text{CO}_2$$

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Answer the following questions :

Question 1

A Complete the following statements :

1. The nearest planet to the Sun is ... while the farthest planet is
2. ... elements don't participate in chemical reactions in ordinary conditions because their outer shell is with electrons.
3. Electric generator changes energy into energy.
4. The chemical bond in sodium chloride (NaCl) molecule is while the chemical bond in nitrogen (N_2) molecule is

B Choose the odd word out then write the scientific term for the rest :

1. Motion of the moon - Motion of pendulum - train motion - Fan motion.
2. Uranus - Neptune - Saturn - Earth.
3. Chlorine - Iron - Copper - Sodium.
4. HCl - HNO_3 - $NaOH$ - H_2SO_4

C Write the chemical equation representing the following reaction and mention its type
Hydrochloric acid is combine with ammonia gas.

Question 2

A Choose the correct answer :

1. The celestial bodies that rotate in a region between Mars and Jupiter are ...
a. meteors. b. meteorites. c. comets. d. asteroids.
2. is a liquid metal.
a. Mercury b. Bromine c. Water d. Chlorine
3. The solid layer of the Earth which contains nickel and iron is ...
a. crust. b. mantle. c. outer core. d. inner core.
4. Electromagnet is used in making
a. electric bell. b. night vision apparatus.
c. remote sensing apparatus. d. pendulum.

B Correct the underline words :

1. Green plants use oxygen gas in photosynthesis process.
2. Sulphur oxides affect nervous system and eye.
3. Car brakes are from the applications of gravitiaional force.
4. Non-metals are bad conductors of electricity except sulphur.

C Give a reason for : policemen advice drivers to use safety belts in cars and planes.

Question 3

1 Write the scientific term of the following :

- 1 Rocks which are formed from the solidification of magma under the Earth crust or lava on the Earth
- 2 Compounds resulting from combination between oxygen and an element.
- 3 The effect which changes the object phase from static to motion or vice versa.
- 4 Breaking down the bonds between reactants to produce new bonds in the product.

2 Give an example of :

- 1 A gas which cause headache and faint.
- 2 The famous comet.
- 3 A metamorphic rock.
- 4 A salt doesn't dissolve in water.

3 Compare between :

Electromagnetic waves and mechanical waves (according to)

1. The speed.
2. Transferring through space.

Question 4

1 Put (✓) or (x) :

1. The rock is formed of one mineral or a group of minerals. ()
- 2 The greatest unit that form the universe is planets. ()
- 3 Strong nuclear forces are used in medicine fields. ()
- 4 Hydrosphere protects the living organisms from harmful ultraviolet rays. ()

2 Choose from column (B) what suits in column (A) :

(A)	(B)
1. Gamma rays	a. consists of head and tail.
2 The mantle	b. consists of mineral calcite.
3. light year	c. used to photographing bones.
4. Limestone	d. used to treatment of some tumors.
	e. equal 9.467×10^{12} km.
	f. rocky layer.

3 Look at the opposite figure which shows the electronic configuration of sodium element then mention.

1. Its valency.
2. Its chemical formula when it combines with Nitrate group.



Answer the following questions :

Question 1

A Complete the following statements :

1. When an element (${}_1X$) combines with oxygen, the symbol of the produced compound is
2. Granite is from igneous rocks, while basalt is from igneous rocks
3. Sound waves are example of waves, while light waves are example of waves
4. $\xrightarrow{\Delta}$ $2MgO$
5. The plant roots extends easily through the upper part of the layer.

B Correct the underlined words :

1. On burning magnesium strip in air, a black powder is formed.
2. The passengers are rushed backward when the car moves suddenly due to friction force
3. Weak nuclear forces are used in producing electric energy.
4. The waves that are used in examining and curing sets of human body are infrared rays.

C Write the chemical formula of :

1. Ferric hydroxide
2. Aluminium oxide

Question 2

A Choose the correct answer :

1. All non-metals don't conduct electricity except
a. bromine, b. graphite, c. sulphur, d. phosphorus.
2. Sodium chloride molecule is considered
a. an acid b. an alkali, c. an oxide, d. a salt.
3. The symbol of phosphate group is
a. $(CO_3)^{-2}$ b. $(PO_4)^{-3}$ c. $(SO_4)^{-2}$ d. $(NH_4)^+$
4. Lubricating and oiling mechanical machines depend on decreasing the effect of force
a. inertia b. friction c. attraction d. electromagnetic
5. changes the mechanical energy into electric energy.
a. Dynamo b. Electromagnet c. Motor d. Electric fan
6. The greatest Earth's layer in thickness is the
a. Earth's crust, b. inner core, c. outer core, d. mantle.

7. The biggest units of universe are

- a. galaxies. b. planets. c. stars. d. moons.

8. All of the following are minerals, that form granite rock except

- a. quartz. b. olivine. c. mica. d. feldspar.

B Complete the following table :

Name of compound	Chemical formula	Number of atoms in the molecule	Number of elements in the molecule
Sulphuric acid	..... (1) .....	..... (2) .....	..... (3)
..... (4)	CuCO_3	..... (5) .....	..... (6)

Question 3

A Put (✓) or (x) :

- The Earth's inner core is rich in iron and nickel. ()
- By increasing the ratio of CO_2 , the air temperature decreases. ()
- Liquids transport through pores and the walls of cells from the higher concentration to the lower one. ()
- The biggest planet in the solar system is Jupiter. ()
- The force is measured in newton. ()
- Water covers about 50% of the Earth's surface. ()
- The head of the comet is considered ice sphere, while its tail is considered a gaseous cloud. ()
- Temperature on the Earth's surface suits the life of living organisms. ()

B Identify the type of the following compounds :

1. H_2SO_4 2. MgO 3. NaCl 4. KOH

C Give reasons for the following :

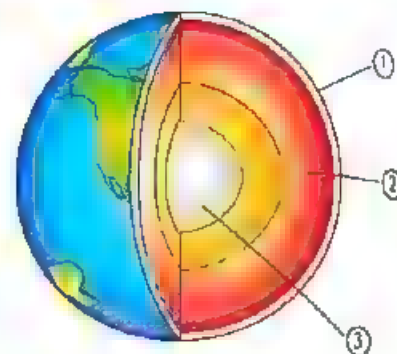
- We see lighting before hearing thunder.
- The density of the outer planets is low.

Question 4

A Choose the odd word out :

- Sodium – Oxygen – Chlorine – Nitrogen.
- NaCl – MgCl_2 – HCl – Na_2SO_4 .
- Gravitational force – Friction force – Nuclear force.
- Mercury – Venus – Jupiter – Mars.

- B** Calculate the mass of an object, if its weight is 460 newton, knowing that the Earth's gravitational acceleration is 10 m/sec^2
- C** Show by drawing the combination between :
1. $(_1\text{H})$ and $(_1\text{H})$ to form hydrogen molecule.
 2. $(_8\text{O})$ and $(_8\text{O})$ to form water molecule.
- D** The following figure represents the layers of the Earth :
Mention the name of each layer and its thickness.



20 El-Beheira Governorate

Science inspectorate

Answer the following questions :

Question 1

- A** Complete each of the following :

1. Motion is divided into several types as and motions.
2. + $\xrightarrow{\Delta}$ 2MgO
3. Salts are produced as a result of chemical combination of with
4. Granite consists of and minerals.

- B** Put (✓) or (✗) :

1. The water of oceans is fresh water. ()
2. Gamma rays used in medical purposes. ()
3. Harms of friction helps to stop and start cars motion. ()
4. Acids produced as a result of the combination of positive ion and negative ions. ()

- C** On a diagram show the electronic configuration of the atom of oxygen $^{16}_8\text{O}$ then show how two of its atoms are bonded to form an oxygen molecule O_2 .

Question 2

- A** Write the scientific term of each of the following :

1. A movement that is repeated regularly at equal intervals.
2. Natural solid materials found in the Earth's crust, consisting of one mineral or a group of minerals.
3. Breaking the chemical bonds between the reactants and forming new bonds between products.
4. Number of electrons lost or gained or even shared by the atom during a chemical reaction

B Mention one importance for each of the following :

1. Gamma rays.
2. Friction forces.
3. Infrared rays.
4. Chemical reactions in industry.

C Give reasons for :

1. An object weight is changed from a place to another.
2. Policemen advise drivers to use safety belts in cars and planes.

Question 3

A Correct the underlined words :

1. The chemical formula of calcium carbonate is CaOH.
2. The weight of a body on Earth is equal to its mass.
3. Sulfur oxide causes irritation of the circulatory system.
4. Visible light is a change in an object position or direction as time passes.

B Choose the correct answer :

1. The ratio between the mass of the reactants to the mass of the products is one.
a. less than b. equal c. more than d. or b both
2. The electromagnet is used in making the
a. calculator. b. electric bell. c. microscope. d. night vision system.
3. When nitrogen (${}_7\text{N}$) gains electrons to complete the last energy level it becomes
a. N^{+3} b. N^{-2} c. N^{-3} d. N^{-}
4. The outer core of the Earth is
a. solid. b. gaseous. c. liquid. d. molten.

C What is meant by each ... ?

1. An object weight is 60 N.
2. Relative motion.

Question 4

A Choose the odd word out, then mention the scientific name of the rest :

1. Uranus – Newton – Jupiter – Mercury.
2. Oceans – seas – rivers – salt lakes.
3. Crust – Soil – mantle – core.
4. Light waves – water waves – microwaves – X-rays.

11 Choose from column (B) which suits column (A) :

(A)	(B)
1. Saturn	a. The fourth nearest planet to the Sun.
2. Mars	b. $Al_2(SO_4)_3$
3. Sodium sulphate	c. Followed by 60 moons.
4. Aluminium sulphate	d. Na_2SO_4

12 Knowing that the mass of carbon C = 12 and oxygen O = 16, find the total mass of reactants and products in the following reaction $C + O_2 \xrightarrow{\Delta} CO_2$

21 El-Menia Governorate

Deirmwas Official School For Languages

Answer the following questions :

Question 1

A Choose the correct answer :

- The valency of ferrous is
a. zero. b. monovalent. c. divalent. d. trivalent.
- layer is rich in iron and nickel.
a. Inner core b. Crust c. Outer core d. Mantle
- Car brakes are one of the application of force.
a. gravitational b. nuclear c. friction d. inertia
- The gases that affect the nervous system and the eye are
a. nitrogen oxides. b. carbon oxides. c. sulphur oxides. d. magnesium oxides

B Correct the underlined word :

- Acids dissolve in water to produce negative hydroxide ion.
- The Earth occupies the fifth position according to its distance from the Sun.
- The motion of simple pendulum is an example of transitional motion.
- The bond in oxygen molecule is a triple covalent bond.

C Write the chemical formula for each of the following :

- Aluminium hydroxide.
- Sodium sulphate.

Question 2

A Write the scientific term :

- The region which separates between the inner and the outer planets.
- A set of atoms joined together, behave like one atom, having a special valency and cannot exists solely.

3. The ability of the Earth to attract objects towards its centre.
4. The only nonmetal that exists in a liquid state.

II Put (✓) or (x) :

1. Burning of coal and cellulose fiber leads to building corrosion. ()
2. Mechanical waves need a medium to transfer through. ()
3. Limestone is a sedimentary rock. ()
4. Heart muscle contraction and relaxation is one of the forces inside the living systems. ()

III Problem :

Knowing that the mass of carbon ($C = 12$) and oxygen ($O = 16$), find the total masses of reactants and products in the following reaction $C + O_2 \xrightarrow{\Delta} CO_2$

Question 3

A Complete the following :

1. The car passengers are rushed ... when the car stops suddenly by the effect of force.
2. and are insoluble salts in water.
- 3 Comets are consist of , and
- 4 Granite is from .. igneous rocks, while basalt is from ... igneous rocks.

B Choose the odd word :

1. Radio waves / Microwaves / Water waves / Light waves.
2. Earth / Venus / Neptune / Halley.
3. Magnesium / Sodium / Mercury / Aluminium.
4. NaOH / Ca(OH)₂ / KOH / HCl.

- C Write one function for :** 1. Ultraviolet rays. 2. Strong nuclear force.

Question 4

A Choose from column (B) which suits it in column (A) :

(A)	(B)
1. Acids	a. Is from metamorphic rocks.
2. Inertia	b. Used in making electric bells.
3. Marble	c. From forces originate due to motion.
4. Electromagnet	d. Change the colour of blue litmus paper into red.

B Look at the figure and answer :

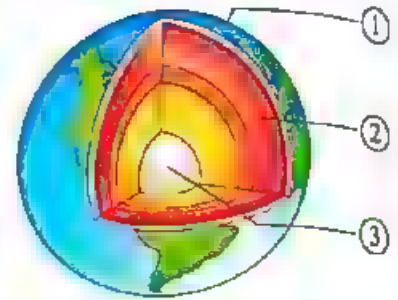
The figure represents

Label the figure.

1.

2.

3.



C Give reasons for :

1. A chemical equation should be balanced.
2. We see lightning before hearing thunder.

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Science Inspectorate

Answer the following questions :

Question 1

A Complete the following sentences :

1. Acids change the colour of litmus paper into
2. Marble is resulted from transformation of
3. rays are used in night vision apparatus.
4. $\text{NH}_3 + \text{HCl} \xrightarrow{\text{Conc.}}$

B Choose from column (B) which suits it in column (A) :

(A)	(B)
1. Contraction and relaxation of the esophagus muscles.	a. meter.
2. The distances between stars are measured in unit.	b. NaOH
3. Weak nuclear force.	c. are used in medicine and industry.
4. Turn the litmus paper into blue.	d. light year.
	e. occurs by the effect of forces inside complex living systems.
	f. NaCl

C Problem : If the Earth's gravitational acceleration in a place is 10 m/s^2 , find the weight of an object if its mass is 28 kg.

Question 2

A Choose the correct answer :

1. The valence of argon ($_{18}\text{Ar}$) is
 a. trivalent. b. divalent.
 c. monovalent. d. zero.
2. The biggest units of universe are
 a. planets. b. stars,
 c. galaxies. d. moons.

3. changes the mechanical energy into electric energy.

- a. Dynamo b. Electromagnet c. Motor d. Electric fan

4. There is a triple covalent bond in molecule.

- a. nitrogen b. oxygen c. chlorine d. hydrogen

B 1. Complete : In a molecule of $Al_2(SO_4)_3$:

1. Number of atoms equals 2. Number of elements equals

2. Put (✓) or (✗) :

1. The atmospheric pressure on the Earth's surface is 76 cm.Hg. ()
2. Lubricants and oils have no effect on friction. ()

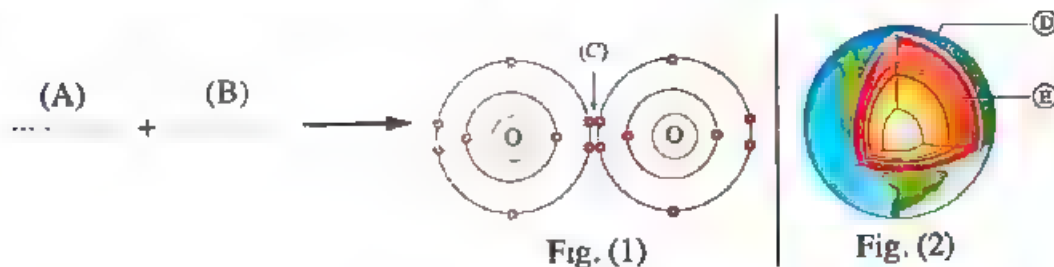
C Compare between electromagnetic waves and mechanical waves (concerning : speed).

Question 3

A Correct the underlined words in each of the following :

- The chemical formula of sodium carbonate is NaCO.
- Egypt seeks to use nuclear energy in producing medicine.
- Fresh water represents 97% and exists in oceans and seas.
- Non-metals are bad conductors of electricity except sulphur.

B Look at the following figures, then label the letters (A), (B), (C), (D) and (E) :



The kind of the bond at letter (C) is

C Give a reason for : the car passengers are rushed forward when the moving car stops suddenly.

Question 4

A Write the scientific term :

- The layer of the Earth, which is rich in iron and nickel.
- A rock formed of lava flows when it comes on the Earth's surface.
- The amount of Earth's gravitational pull on an object.
- Small space bodies that are affected by the planet's gravity.

B Cross the odd word out :

- H_2O – HBr – HCl – HNO_3
- Light waves – Sound waves – Microwaves – Radio waves.

3. Mars – Saturn – Venus – Mercury.
4. Work – Mass – Weight – Earth's gravitational acceleration.

Ⓒ Give an example for a salt dissolves in water.

23

Sohag Governorate

Sabry Abou Hussien Lang. School

Answer the following questions :

Question 1

Ⓐ Complete the following statements :

1. The bond in oxygen molecules is ... bond while the bond in nitrogen molecules is ... bond.
2. Electric motor changes energy into energy.
3. Acid changes the colour of litmus paper into ... while bases change the colour of litmus paper into
4. The nearest planet to the Sun is and farthest one from the Sun is

Ⓑ Identify the type of compound :

1. HCl.
2. MgO.
3. NaCl.
4. KOH.

Ⓒ Find the weight of object of 100 k.g mass knowing that Earth gravitational acceleration is 9.8 m/s^2

Question 2

Ⓐ Write the scientific term :

1. System that consists of thousands of millions of stars.
2. Motion which is regular repeated in equal periods of time.
3. Breaking the reactants bonds and forming new bonds among the products.
4. Ability of Earth to attract object to its center.
5. Distance covered by light in one year.
6. The atom that does not lose or gain any electrons.
7. Small rocky masses burn up completely in Earth's atmosphere.

Ⓑ Write the chemical formula :

1. Aluminium hydroxide.
2. Sodium oxide.
3. Carbon dioxide.
4. Water.

Ⓒ What happens when ... ?

1. The atom loses electron or more.
2. Burning of magnesium ribbon in air.
3. The ratio of carbon dioxide gas increases in air.

Question 3

A Choose the correct answer :

1. Electromagnet used in making
a. electric winch. b. calculator. c. microscope.
2. Planets revolve around the Sun in paths.
a. circular b. spiral c. oval
3. is liquid metal.
a. Mercury b. Nitrogen c. Magnesium
4. The valency of argon is
a. zero. b. monovalent. c. divalent.
5. From the examples of force inside living system
a. pulse. b. inertia. c. brakes.
6. The inertia force affects the object.
a. moving b. static c. moving and static

B Give reasons for :

1. Chemical equation should be balanced.
2. We see lightning before hearing thunder.
3. Using safety belt in cars and buses.

C What is the importance of ... ?

1. Oxygen gas.
2. Carbon dioxide.

Question 4

A Correct the underlined words :

1. Motion of simple pendulum is circular motion.
2. Friction causes great loss of chemical energy.
3. The bond in sodium chloride is single covalent bond.
4. The Earth consists of four layer.
5. The telescope is used to identify mineral.
6. Valency formula represents the number and type of atoms in a molecule.
7. Non-metal are bad conductor of electricity except sulphur.

B Knowing that the mass of carbon C = 12 and oxygen = 16, find the total masses of reactants and products through the following reaction :



C Compare between :

1. Inner planets – outer planets according to (size).
2. Metals – non-metals according to (number of electron).

Answer the following questions :

Question 1

A Complete the following statements :

1. The chemical bond in magnesium oxide molecule is
2. Dynamo changes energy into electric energy.
3. Regarding the volume, the Earth occupies the order ascendingly in the solar system.
4. The main component of sandstone is mineral.

B Complete the following table :

Compound	Chemical formula
1. Sulphuric acid
2. Sodium hydroxide
3. Aluminium oxide
4. Calcium carbonate

C Give a reason for the following :

We receive the sunlight and we don't hear the sound of solar explosion.

Question 2

A Write the scientific term :

1. An atom lose an electron or more during a chemical reaction.
2. Rocky masses that fall from the space and reaches the Earth's surface.
3. The effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the motion direction.
4. A rock which has a pink or grey colour and found in eastern desert.

B Choose the odd word :

1. Sodium – Oxygen – Chlorine – Nitrogen.
2. Mercury – Venus – Jupiter – Mars.
3. Light waves – Sound waves – Radio waves – Microwaves.
4. Sodium chloride – Calcium nitrate – Sodium sulphide – Silver chloride.

C What's meant by valency ?

Question 3

A Choose the correct answer :

- The sum of reactant masses in any chemical reaction is the sum of product masses.
a. doubled b. more than c. equal to d. less than
- The electromagnet is used in making
a. calculator. b. electric bell. c. microscope. d. night vision.
- Planets revolve around the Sun in paths.
a. circular b. elliptical c. spiral d. irregular
- has a white colour when it is pure and coarse texture.
a. Marble b. Limestone c. Sandstone d. Basalt

B Correct the underlined words :

- On burning magnesium strip in the presence of oxygen gas, blue powder is formed.
- The mantle layer of the Earth is rich in nickel and iron.
- The passengers are rushed backward when the car moves suddenly due to friction force.
- Ultraviolet rays are used in photographing bones to detect the sites of bone fractures.

C If the Earth's gravitational acceleration is 9.8 m/sec^2 , find the weight of 0.5 kg. mass ball.

Question 4

A Put (✓) in front of the right statement and (✗) in front of the wrong one :

- The bond in nitrogen molecule is a triple covalent bond. ()
- Weak nuclear forces are used in producing electric energy. ()
- Crust is the outer layer of Earth. ()
- Ozone layer protects the living organisms from harmful infrared rays. ()

B Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Vibrating motion.	a. motion of sound waves.
2. Circular motion.	b. motion of train.
3. Wave motion.	c. motion of moon around Earth.
4. Transitional motion.	d. motion of simple pendulum.

C What happens when approaching a wet rod with hydrochloric acid to ammonia gas ?

Answer the following questions :

Question 1

A Write the scientific term :

1. The distance covered by light in one year.
2. Motion which is regularly repeated in equal periods of time.
3. Breaking the reactants bonds and forming new ones among the products.
4. The largest planet in the solar system
5. The number of electrons gained, lost or even shared by an atom during a chemical reaction

B Write one use for :

1. Infrared ray.
2. X-rays.
3. Electromagnet.
4. Ultraviolet rays.

C Give a reason for :

1. We see lightning before hearing thunder.
2. The car passengers rushed forward when the car stops suddenly.

Question 2

A Complete the following :

1. is an example of igneous rocks while is an example of sedimentary rocks.
2. Electric motor changes energy into energy.
3. The bond in sodium chloride is whereas the bond in oxygen molecule is
4. Green plants use in photosynthesis process.
5. The Earth inner core is rich in and

B Write the chemical formula of :

1. Calcium nitrate.
2. Aluminium oxide.

C Write what the following numbers refer :

1. 76 Cm.Hg.
2. 365.25 day.
3. 5.9×10^{24} kg.

Question 3

A Correct underlined words :

1. Milky way galaxy takes an oval shape with straight arms.
2. The water of oceans is fresh water.

3. Oxygen gas represent 78% of atmosphere volume.
4. Nitrogen oxides are formed during occurrence of earthquakes.

B Determine the type of the following compounds :

1. KOH
2. MgO
3. HCl
4. AgCl

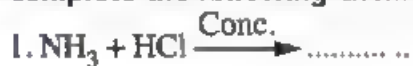
C Problem : An object of mass 100 kg on Earth, calculate its weight knowing that the Earth's gravitational acceleration is 9.8 m/s^2

Question 4

A Choose the correct answer :

1. Car brakes is an application on force.
 - a. friction
 - b. inertia
 - c. gravitational
2. The measuring unit of force is
 - a. kg.
 - b. joule.
 - c. newton.
3. Planets revolve around the Sun in paths.
 - a. circular
 - b. spiral
 - c. elliptical
4. The valency of argon is
 - a. monovalent.
 - b. divalent.
 - c. zero.

B Complete the following chemical equations :



C Give one difference between :

1. Acids and bases.
2. Inner planets and outer planets.
3. Metals and non-metals.

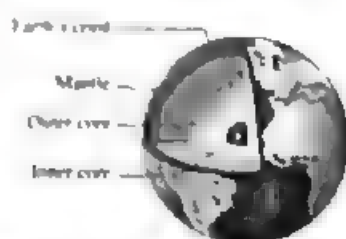
Cairo Governorate

1 St. Joseph's School

1 (A) 1. c 2. c 3. n 4. n

- (B) 1. It changes into a negative ion.
2. A white powder of magnesium oxide is formed.
 $2Mg + O_2 \xrightarrow{\Delta} 2MgO$ (white powder)
3. It will increase the speed of moving object.

(C)

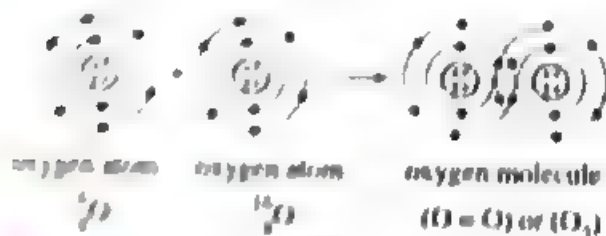


2 (A) 1. Electric motor. 2. Nitrogen gas.
3. Force 4. chemical reaction.

(B) 1. $2Mg + O_2$
2. $2MgO + O_2$

- (C) 1. It is a region that separates the group of the inner planets from the group of outer planets.
2. They are resistant forces (against motion) originated between the object in motion and the medium touching it.

(D)



3 (A) 1. Oxygen 2. iron
3. gravitational force 4. heat

(B)

Points of comparison	Sedimentary rock	Igneous rock
1. Colour	Dark to grey	Dark
2. Kind	Plutonic, igneous rock	Volcanic, igneous rock

- (C) 1. This means that the element doesn't participate in any chemical reaction in ordinary conditions due to the completeness of its outermost energy level with electrons.
2. This means that the ability of the Earth to attract this object equals 30 newton.
3. This means that the marble originated as a result of exposing limestone to the factors of pressure and high temperature.

4 (A) 1. (✓) 2. (x) 3. (x) 4. (✓)

- (B) 1. Because it protects living organisms from the harmful ultraviolet radiations.
2. Because the upper part is fragmented and loosened layer.
3. Because Aluminium atom loses its outermost three electrons and changes into positive ion in chemical reaction.

(C) Mass = $\frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$
 $= \frac{280}{10} = 28 \text{ kg.}$

2 Maadi Educational Zone

- 1 (A) 1. Mercury – Neptune.
2. mass of each object – distance between them.
3. periodic – transitional.
4. igneous – metamorphic

(B) 1. $2MgO$

2. Direct combination of a metal with nonmetal
3. Heat energy has broken the double covalent bond in an oxygen molecule (O_2) to give two active oxygen atoms
4. Mass of reactants = $(2 \times 24) + (2 \times 16)$
 $= 80 \text{ gm.}$

Mass of products = $2(24 + 16) = 80 \text{ gm}$

- (C) 1. Making remote sets
2. They are used for identifying the celestial bodies.

3 (A) 1. Comets, 2. Electric generator.
3. Rocks, 4. Magma.

(B)

Points of comparison	Inner planets	Outer planets
1. Definition	They are the nearest four planets to the Sun.	They are the farthest four planets to the Sun.
2. Size	Small in size.	Big in size.

- (C) 1. To decrease friction between moving parts of machines and prevent their erosion.
2. Due to the presence of the atmosphere that appears as a white colour around the Earth.

- 3 (A) 1. a 2. b 3. c 4. b
(B) 1. (*) 2. (✓) 3. (✓) 4. (✓)

- (C) 1. It is an effect that attempts to change the object's state from being static to motion or vice versa or attempts to change the direction of motion.
2. The chemical compound is formed from combination of its elements by constant weight ratios.

- 4 (A) 1. X-rays. 2. Nitrogen oxides
3. The inner core 4. The electromagnet
(B) 1. a - 4 2. b - 3
3. c - 2 4. d - 1

- (C) Distance in kilometre
= Distance in light year $\times 9.467 \times 10^{12}$
= $3 \times 9.467 \times 10^{12}$
= 28.401×10^{12} km

3 El-Balqa official Language School

- 1 (A) 1. NH_4Cl
2. ionic - double covalent bond.
3. electric - mechanical
4. forward - inertia
(B) 1. c 2. e 3. b 4. a
(C) Mgf
2 (A) 1. Light year. 2. Mechanical waves.
3. valency. 4. Force.
(B) 1. $(\text{OH})^-$ 2. third
3. bases 4. heat

- (C) Because acids when dissolved in water produce positive hydrogen ions H^+ which is responsible for their properties.

- 2 (A) 1. (✓) 2. (✓) 3. (*) 4. (✓)
(B) 1. non-metal. 2. Monovalent.
3. gains 4. negative ion.
(C) It changes into a positive ion.

- 4 (A) 1. c 2. b 3. a 4. a
(B) 1. Oxide. 2. Base.
3. Acid. 4. Salt.

- (C) Weight of object
= Mass \times Earth's gravitational acceleration
= $10 \times 9.8 = 98$ Newton

4 Rod-El-farag Educational Zone

- 1 (A) 1. periodic - transitional
2. ionic - single covalent
3. sedimentary - metamorphic
4. electric - magnetic.
(B) 1.

Points of comparison	Granite	Basalt
1. kind	Plutonic igneous rock	Volcanic igneous rock
2. Minerals forming it	Quartz, feldspar and mica.	Olivine, feldspar and pyroxene

2.

Points of comparison	Mechanical waves	Electromagnetic waves
1. Definition	They are produced by the vibration of medium particles	They are accompanied by electromagnetic forces
2. Speed	Their speed is relatively low.	Their speed is extremely high equals 300 millions m/sec.

(C)
$$\text{Mass} = \frac{\text{Object's Weight}}{\text{Earth's gravitational acceleration}}$$

= $\frac{980}{9.8} = 100$ kg.

- 2 (A) 1. a. 2. b. 3. d 4. d
- (B) 1. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.
2. Because their outermost energy levels are completely filled with electrons so they don't lose, gain or share with any electrons.
3. Because they consist mainly of gaseous bodies.
4. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

(C) 1. NH_4Cl 2. 2HCl

- 3 (A) 1. Valency. 2. Magma.
3. Base 4. Periodic motion.

- (B) 1. Sound wave.
2. Hydrochloric acid (HCl)
3. Mercury.
4. Sodium chloride. (NaCl)

- (C) 1. Making remote sets.
2. producing electricity

- 4 (A) 1. (x) 2. (x) 3. (✓) 4. (✓)
- (B) 1. $\text{Cu}(\text{NO}_3)_2$ 2. H_2SO_4
3. NaOH 4. CaSO_4

- (C) 1. It causes air pollution and lung cancer.
2. The driver will be rushed forward.

5 St. Joseph Maronite Language School

- 1 (A) 1. reflecting telescope – refracting telescope.
2. positive hydrogen (H^+) – negative hydroxide (OH^-)
3. Mercury – Jupiter
4. Plutonic igneous – sedimentary

- (B) 1. It converts the electric energy into mechanical energy.
2. They are used in :
• Night vision systems used by modern military forces.
• Remote sensing instrument to photographing the Earth's surface using satellites.
• Cooking food.
• Making remote sets.

3. They are used in :
• photographing bones to detect the sites of bone fractures.
• Examining mineral raws in industry and showing errors, pores and cracks in these minerals.
4. It is used in :
• Photographic cameras.
• Television cameras.
• Light shows.

$$(C) \text{ Mass} = \frac{\text{Object's Weight}}{\text{Earth's gravitational acceleration}}$$

$$= \frac{98}{9.8} = 10 \text{ kg.}$$

- 2 (A) 1. Because their outermost energy levels are completely filled with electrons so they don't lose, gain or share with any electrons.
2. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
3. Because there is no force acts on it.
4. Due to the presence of the atmosphere that appears as a white colour around the Earth.

- (B) 1. Mercury. 2. third
3. elliptical (oveal) 4. strong nuclear

- (C) - Mass of reactants = $12 + (2 \times 16) = 44 \text{ gm.}$
- Mass of products = $12 + (2 \times 16) = 44 \text{ gm}$

- 3 (A) 1. Ionic bond.
2. Electromagnetic waves.
3. Relative motion.
4. Electric generator (dynamo).
- (B) 1.

Point of comparison	Transitional motion	Periodic motion
Definition :	It is a motion in which the object's position is changed from time to time between initial and final positions.	It is motion which is repeated at equal periods of time.

2

Point of comparison	Metals	Non-metals
No. of electrons in outer shell :	They have less than 4 electrons in outermost energy level	They have more than 4 electrons in outermost energy level

(C) 1. It is the distance covered by light in one year and it equals 9.467×10^{12} km

2. They are bodies swim in space such as stars, planets, moons and rocky or gaseous bodies.

8 (A) 1. b 2. c 3. b 4. b

(B) 1. The driver and passengers will be rushed forward.

2. The combustion processes will be fast, and proceed without any control.

(C) 1. NaOH. 2. H_2SO_4 .

6 Wetwan Educational Zone

1 (A) 1. Chemical reaction. 2. Relative motion.
3. Meteors. 4. Negative ion.

(B) 1. It is used for identifying the celestial bodies.

2. $NH_3 + HCl \xrightarrow{\text{conc}} NH_4Cl$ (white clouds)

3. Periodic motion (vibrating) motion

4. Iron and Nickel

(C) Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves

2 (A) 1. H_2SO_4
2. Friction of machine parts.

1. Mercury. 4. ^{12}Mg

(B) 1. Ca^{40} 2. strong nuclear

3. Halley 4. zero.

(C) • Properties of Granite rock :

- It is heavy
- It has rough texture.
- It is solid, cohesive and it isn't easily broken.

• Minerals forming it :

It consists of 3 main minerals which are Quartz, Mica and Feldspar.

3 (A) 1. a 2. d 3. b 4. c

(B) 1. e 2. d 3. a 4. c

(C) The weight of the object decreases, while its mass remains constant.

4 (A) 1. (✓)

2. (×) _____ inertia force.

3. (✓)

4. (×) _____ the mechanical energy into electric energy.

(B) 1. Metals.

2. Mars

3. Infrared (IR)

4. doesn't dissolve

(C) Burning of coal and cellulose fibers such as paper and cigarettes is bad behavior cause air pollution and lung cancer.

Giza Governorate

7 North Giza Educational Zone

1 (A) 1. (×) _____ rushed forward

2. (×) _____ about 71 % of _____

3. (✓)

4. (✓)

(B) 1. e

2. c

3. a

4. d

(C) 1. $^{24}_{12}Mg$ $\left(\begin{array}{c} K \\ 2 \end{array} \right) \left(\begin{array}{c} L \\ 8 \end{array} \right) \left(\begin{array}{c} M \\ 2 \end{array} \right)$ valency = 2

2. $^{35}_{17}Cl$ $\left(\begin{array}{c} K \\ 2 \end{array} \right) \left(\begin{array}{c} L \\ 8 \end{array} \right) \left(\begin{array}{c} M \\ 5 \end{array} \right)$ valency = 1

2 (A) 1. Chemical equation.

2. Periodic motion.

3. Carbon dioxide gas (CO_2)

4. Galaxy

(B) 1. HCl.

2. Sodium.

3. Sound waves

4. Jupiter

(C) Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

3 (A) 1. mercury – bromine.

2. mechanical – electromagnetic.

3. NH_4Cl .

4. Mercury – Neptune.

(B) 1. Making remote sets.

2. Identifying celestial bodies.

3. photographing bones to detect the sites of bone fractures.

4. Plants use it to form proteins.

$$\begin{aligned} \text{(C) Mass} &= \frac{\text{Object's Weight}}{\text{Earth's gravitational acceleration}} \\ &= \frac{980}{9.8} = 100 \text{ kg.} \end{aligned}$$

4 (A) 1. c 2. a 3. a 4. a

(B) 1.

Point of comparison	Crust	Mantle
Thickness :	Ranges between 8 – 60 km approximately	About 2885 km approximately

2.

Point of comparison	Acids	Bases
Colour of litmus paper :	They change the colour of litmus paper into red due to the presence of hydrogen ions H^+	They change the colour of litmus paper into blue due to the presence of hydroxide ions $(\text{OH})^-$

3.

Point of comparison	Weak nuclear force	Strong nuclear force
Use	It is used to get radioactive elements and radiations which are used in medicine.	It is used in producing electricity.

4.

Point of comparison	Electric generator	Electric motor
Conservation of energy :	It converts the mechanical energy into electric energy	It converts the electric energy into mechanical energy.

(C) It changes into a positive ion.

8 Science Inspectorate

1 (A) 1. ionic bond – single covalent bond

2. decreases.

3. mechanical wave – electromagnetic wave.

4. Plutonic – volcanic.

5. Jupiter – Earth.

6. electric – mechanical

7. Zero – divalent.

(B) $\text{H}_2\text{SO}_4 - \text{Ca}(\text{OH})_2 - \text{Na}_2\text{CO}_3 - \text{Al}(\text{OH})_3 - \text{NH}_4\text{NO}_3$

$$\begin{aligned} \text{(C) Weight} &= \text{Mass} \times \text{Earth's gravitational acceleration} \\ &= 700 \times 9.8 = 6860 \text{ Newton} \end{aligned}$$

2 (A) 1. Periodic motion. 2. Nobel gas.

3 Comet.

4. Chemical reaction.

5 Sulphur oxides. 6. Transitional motion.

(B) Sodium chloride (NaCl) – Sulphuric acid – (H_2SO_4)

Carbon dioxide (CO_2) – Heart muscle contraction and relaxation.

(C) 1.

Point of comparison	Meteors	Meteorites
Definition :	They are small rocky masses that burn up completely when fall within the atmosphere of the Earth as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.	They are large rocky masses that do not burn up completely when they penetrate the atmosphere of the Earth and the remaining part of them without burning falls on the Earth's surface

2.

Point of comparison	Acids	Bases
Definition :	They are substances which dissociate in water producing hydrogen ions H^+	They are substances which dissociate in water producing hydroxide ions $(\text{OH})^-$

8 (A) - Mass of reactants = $2 \times (1 \times 2) + (2 \times 16)$
= 36 gm

Mass of products = $2 (2 \times 1 + 16) = 36$ gm.

(B) 1. b 2. b 3. b 4. a 5. b

(C) 1. White clouds of ammonium chloride are formed



2. The mass of the bird remains fixed, while the weight of the bird decreases.

3. They burn up completely as a result of the heat produced from their friction with air and they can be seen as luminous arrows by the naked eye.

4. A white powder of magnesium oxide is formed



9 (A) 1. Weight 2. carbon dioxide
3. third 4. vibrating.

(B) 1. Because the number of electrons becomes less than the number of protons.

2. To increase friction between tyres and the road to help car in starting and stopping motion.

3. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves

4. Due to

- The presence of hydrosphere,
- The presence of the atmospheric envelope containing oxygen gas which is needed for life,
- Its temperature is suitable during both day and night.
- Its atmospheric pressure and its gravitational force are suitable

(C) 1. It helps in burning match.

2. Identifying celestial bodies.

3. They are used to sterilize the sets of surgical rooms.

4. It protects living organisms from the harmful ultraviolet rays.

9 - Glass Experimental Directorate

1 (A) 1. ionic - single covalent

2. Mercury - Neptune

3. periodic - transitional

4. igneous - metamorphic

(B) 1. (✓) 2. (✓) 3. (✓) 4. (✗)

(C) Weight = Mass \times Earth's gravitational acceleration
= $20 \times 9.8 = 196$ Newton.

2 (A) 1. Force. 2. Valency.
3. Infrared rays (IR). 4. Galaxy.

(B) 1. b 2. d 3. a 4. c

(C) - Electric generator : It converts the mechanical energy into electric energy.

- Electric motor : It converts the electric energy into mechanical energy.

3 (A) 1. a 2. c 3. a 4. b

(B) 1. Movement of the moon around the Earth.

2. Sandstone.

3. Silver chloride (AgCl).

4. Earth.

(C) Due to inertia, as they try to maintain their state of motion.

4 (A) 1. Periodic 2. third
3. light year. 4. air pollution.

(B) 1. H_2SO_4 2. $\text{Cu}(\text{NO}_3)_2$
3. NH_4Cl 4. Na_2CO_3

(C) - Mass of reactants = $(2 \times 24) + (2 \times 16)$
= 80 gm.

- Mass of products = $2 \times (24 + 16) = 80$ gm.

10 - Science Inspectorate

1 (A) 1. ionic - double covalent

2. $\text{H}_2\text{O} - \text{HNO}_3$

3. mechanical - electromagnetic

(B) 1. Nitrogen oxides

2. Ultraviolet (UV) rays

3. forces of friction.

4. crust.

(C) White clouds of ammonium chloride are formed.



- 2 (A) 1. Valency. 2. Positive ion.
3. Gravitational force. 4. Light year.

- (B) 1. $(\text{PO}_4)^{3-}$ 2. Sulphur (S).
3. Weak nuclear force. 4. Marble.

(C) Weight = Mass \times Earth's gravitational acceleration
= $10 \times 9.8 = 98$ Newton.

- 3 (A) 1. b 2. a 3. c 4. c

- (B) 1. HCl 2. NaCl
3. Mercury 4. Pollution

(C) - Electric generator : It converts the mechanical energy into electric energy.
- Electric motor : It converts the electric energy into mechanical energy.

- 4 (A) 1. (*) rushed forward.
2. (✓) 3. (✓)
4. (*) represents 71%.

- (B) 1. used in manufacture of medicines.
2. stopping the forces of inertia.
3. It helps in stopping and starting cars motion.
4. It is used by green plants in photosynthesis process to form food for other living organisms including people.

(C) To achieve the law of conservation of matter.

Alexandria Governorate

11 Science Inspectorate

- 1 (A) 1. NH_4Cl .
2. bones.
3. The belt of the wanderer asteroids.
4. Iron and Nickel.

- (B) 1. Graphite.
2. Sodium hydroxide (NaOH).
3. Heart muscle contraction and relaxation.
4. Sound waves.

(C) Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.



1. ${}_{13}\text{Y} {}_8\text{X}$
2. negative ion – positive ion.
3. ionic bond.
4. double covalent bond.

- (B) 1. Chemical reaction.
2. Force. 3. Comets.
4. Light year.

(C) Mass = $\frac{\text{object's weight}}{\text{Earth's gravitational acceleration}}$
= $\frac{100}{9.8} = 10.2 \text{ kg}$.

- 3 (A) 1. b 2. c 3. a 4. d
(B) 1. c 2. a 3. d 4. b
(C)

Point of comparison	Strong nuclear force	Weak nuclear force
Uses :	It is used in producing electricity and military purposes.	It is used to get radioactive elements and radiations which are used in medicine, industry and scientific researches.

- 4 (A) 1. CaSO_4 2. 6 atoms.
3. 3 elements. 4. Salt.
5. Magnesium oxide. 6. 2 atoms.
7. 2 elements. 8. metal oxide.

- (B) 1. low 2. carbon dioxide (CO_2)
3. igneous 4. mantle

(C) Parts of machines get hot and erosion occurs.

12 El-Agamy Educational Zone

- 1 (A) 1. c 2. a 3. d 4. b
5. a 6. d

(B) 1

Points of comparison	Inner planets	Outer planets
1. Distance from the Sun :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
2. Size :	Small in size	Big in size

2

Points of comparison	Metals	Non-metals
1. Metallic luster :	They have metallic luster.	They have no luster.
2. Number of electrons in outer shell :	They have less than (4) electrons in the outermost energy level	They have more than (4) electrons in the outermost energy level.

- 2 (A) 1. Meteors.
2. Electric generator (Dynamo).
3. Valency. 4. Jupiter.
5. Carbon dioxide (CO₂) 6. Igneous rocks.

- (B) 1. Acid. 2. Oxide
3. Salt. 4. Base.

- (C) 1. Due to :
• The presence of hydrosphere.
• The presence of the atmospheric envelope containing oxygen gas which is needed for life.
• Its temperature is suitable during both day and night.
• Its atmospheric pressure and its gravitational force are suitable.
2. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

- 3 (A) 1. (✓) 2. (✗) 3. (✗)
4. (✓) 5. (✓) 6. (✗)

- (B) 1. Making remote sets.
2. It is used to get radioactive elements and radiations which are used in medicine.
3. It is used in making electric bells.
4. They are used in medical purposes as the treatment and discovering of some swellings.

- (C) 1. ${}_8\text{O} \rightarrow$ non-metal ${}_{12}\text{Mg} \rightarrow$ metal
2. double covalent
3. ionic
4. divalent.

- 4 (A) 1. Marble. 2. (NH₄)⁺
3. Sound waves. 4. Nitrogen gas.
5. Carbon dioxide (CO₂). 6. Lute.
(B) 1. CaCO₃ 2. Al₂O₃
(C) 1. It changes into a positive ion
2. The passengers will be rushed backward.

13 Al-Montazah Educational Zone

- 1 (A) 1. (✓)
2. (✗) is a stringed
3. (✗) Earth's crust.
4. (✓)
5. (✗) measured by light year.
(B) 1. ${}_8\text{O} \rightarrow$ non-metal ${}_{12}\text{Mg} \rightarrow$ metal
(Oxygen atom) (magnesium atom)
2. ionic

- 2 (A) 1. a 2. a 3. d 4. d 5. b
(B)

Points of comparison	Inner planets	Outer planets
1. The distance from the Sun :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
2. Size :	Small in size	Big in size

$$(C) \text{ Weight} = \text{Mass} \times \text{Earth's gravitational acceleration} \\ = 98 \times 10 = 980 \text{ Newton}$$

- 3 (A) 1. Marble. 2. Sound wave.
3. Carbon dioxide (CO₂)
4. (NH₄)⁺ 5. Nitrogen gas.
6. Halley's comet.
(B) 1. CaCO₃ 2. NaOH
(C) 1. It changes into a positive ion.
2. The passengers will be rushed backward.

- 4 (A) 1. Meteors.
2. Electric generator (dynamo).
3. Valency. 4. Sulphur oxides.
5. Igneous rocks.

- (B) 1. Acid. 2. Metal oxide.

(C) Due to :

- The presence of hydrosphere.
- The presence of the atmospheric envelope containing oxygen gas which is needed for life.

Al Qalyoubia Governorate

14 Shoubra El-Khima Educational Zone

- 1 (A) 1. Electric generator (dynamo).
2. zero – completely filled.
3. Basalt – granite
4. Magnesium – two – Oxygen
5. reflecting telescope – refracting telescope
6. Infrared (IR) – X-rays.

- (B) 1. Al_2O_3 2. K_2CO_3
3. H_2SO_4 4. NaOH

- (C) 1. $H_2 + Cl_2 \rightarrow 2HCl$
2. $2NO + O_2 \rightarrow 2NO_2$

- 2 (A) 1. b 2. c 3. a 4. c 5. a

(B)

Points of comparison	Acids	Bases
1. Dissociation in water :	Dissociate in water producing hydrogen ions (H^+)	Dissociate in water producing hydroxide ions (OH^-)
2. Effect on litmus paper :	They change the colour of litmus paper into red.	They change the colour of litmus paper into blue

$$(C) \text{ Mass} = \frac{\text{object's weight on Earth}}{\text{Earth's gravitational acceleration}} \\ = \frac{80}{10} = 8 \text{ kg.}$$

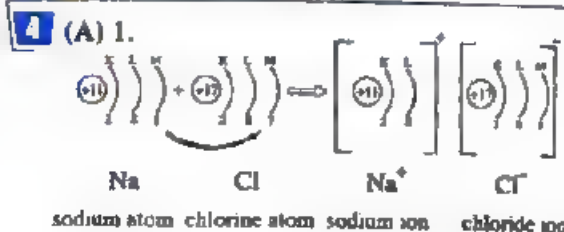
Gravity acceleration on mars

$$= \frac{\text{object's weight on mars}}{\text{mars}} = \frac{32}{8} = 4 \text{ m/s}^2$$

- 2 (A) 1. Valency.
2. Direct combination reactions.
3. Force. 4. Igneous rocks.
5. The belt of the wanderer asteroids.
6. Friction forces.

- (B) 1. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
2. Because they consist mainly of gaseous bodies.
3. Because it arises by sharing each oxygen atom with two electrons to complete its outermost shell with 8 electrons and becomes more stable.

- (C) - Mass of reactants = $12 + (16 \times 2) = 44 \text{ gm.}$
- Mass of products = $12 + (16 + 2) = 44 \text{ gm}$



2. Ionic bond.

- (B) 1. White clouds of ammonium chloride are formed.



2. The passengers may be injured.

- (C) 1. Newton 2. chloride
3. monoatomic. 4. Basalt
5. periodic 6. equal to

Sharkia Governorate

15 Minya Al-Qamh Educational Zone

- 1 (A) 1. Positive ion.
2. Gravitational force.
3. Covalent bond.
4. Force.

- (B) 1. Na_2SO_4 2. inertia force.
3. friction force 4. $Ca(NO_3)_2$

- (C) - Mass of reactants = $12 + (2 \times 16) = 44 \text{ gm.}$
- Mass of products = $12 + (2 \times 16) = 44 \text{ gm}$

- 2 (A) 1. triple covalent bond – ionic bond.
2. electric winches – electric bells.
3. Mercury – Neptune.
4. nervous – respiratory.

- (B) 1. The average radius of the Earth.
 2. The number of electrons that fill the outermost shell in noble gases.
 3. The normal atmospheric pressure on the Earth.
 4. The number of the well known elements up till now.
- (C) 1. Because the sunlight is electromagnetic waves which can travel through free space, while the sound of solar explosions is mechanical waves which can't travel through free space.
 2. Due to inertia, as they try to maintain their state of motion.

3 (A) 1. a 2. c 3. b 4. b

- (B) 1. biological force. 2. $MgCl_2$
 3. Sound waves 4. Sodium.

- (C) 1. It protects living organisms from the harmful ultraviolet rays.
 2. Plants use it to form proteins.

4 (A) 1. (x) into red.
 2. (✓)
 3. (x) is divalent.
 4. (✓)

- (B) 1. d 2. a 3. b 4. c
 (C)

Points of comparison	Inner planets	Outer planets
1. Definition :	They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.
2. Size :	Small in size.	Big in size

Menofeya Governorate

18 Ashmoun Educational Zone

- 1 (A) 1. Oxygen - element,
 2. Mercury - Neptune,
 3. Ionic bond - double covalent bond.
 4. mercury - bromine.

- (B) 1. Sulphuric acid.
 2. Calcium carbonate.
 3. Ammonium hydroxide.

- 2 (A) 1. Because it makes the life possible through :
 • constancy and steadfastness of objects and living organisms on its surface.
 • steadfastness of the hydrosphere position on its surface.
 • keeping the Earth surrounded by the atmosphere.
 2. Because they consist mainly of gaseous bodies.
 3. Because acids when dissolved in water produce positive hydrogen ions H^+ which responsible for their properties.
 4. To decrease friction between moving parts of machines and prevent their erosion.

- (B) 1. equal to 2. moons
 3. Basalt 4. The electromagnet.

- (C) 1. positive ion 2. monovalent

3 (A) 1. (✓) 2. (✓) 3. (x)
 4. (x) 5. (✓) 6. (x)

- (B) 1. The driver and passengers will be rushed forward.
 2. They convert into metamorphic rocks.
 3. The temperature of air increases as CO_2 causes the green house effect.
 4. A white powder of magnesium oxide is formed. $[2Mg + O_2 \xrightarrow{\Delta} 2MgO \text{ (white powder)}]$

4 (A) 1. Ion, 2. Light year.
 3. Force, 4. Atomic group.
 5. Igneous rocks. 6. Mechanical waves.

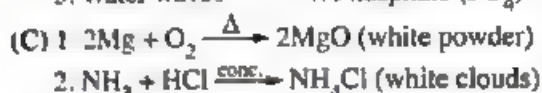
- (B) 1. They are used in medical purposes as the treatment and discovering of some swellings.
 2. They are used in examining and curing equipments for the human body.
 3. It is used in producing electricity.
 4. They are used in many industries such as manufacture of medicines.

El-Gharbia Governorate

17 El-Nasr Language School

- 1 (A) 1. Mercury – bromine.
2. electric – magnetic
3. single covalent – triple covalent.
4. plutonic – volcanic

- (B) 1. Flute. 2. Marble
3. Water waves 4. Phosphate (PO_4)⁻³



- 2 (A) 1. Nobel gases. 2. Safety belts
3. Metal oxides.
4. The wanderer belt of asteroids

(B)

Odd word	Scientific term
1. Aluminium	Monovalent metallic elements
2. Mercury	Inner planets that has atmosphere.
3. Friction forces	Fundamental forces in nature
4. $_{17}\text{Cl}$	Metals

(C) Weight = Mass \times Earth's gravitational acceleration = $28 \times 10 = 280$ Newton.

- 3 (A) 1. (*) Nitrogen oxides
2. (✓) 3. (*) X-rays
4. (✓)

- (B) 1. 3 2. 2885 km 3. 78 % 4. 9

- (C) 1. Due to heart muscle contraction and relaxation.
2. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

- 4 (A) 1. b 2. c 3. d 4. b
(B) 1.

Point of comparison	Acids	Bases
Affecting on litmus paper :	They change colour of litmus paper into red due to the presence of hydrogen ions H^+	They change colour of litmus paper into blue due to the presence of hydroxide ions (OH^-)

2.

Point of comparison	Electric generator	Electric motor
Conversion of energy :	It converts mechanical energy into electric energy such as dynamo.	It converts electric energy into mechanical energy such as electric motor in mixer

3.

Point of comparison	Outer planets	Inner planets
Density :	Low densities ranging from 0.7 to 1.3 g/cm^3	High densities ranging from 3.3 to 5.5 g/cm^3 .

4.

Point of comparison	Train motion	Simple pendulum motion
Type of motion :	Transitional motion	Vibrating periodic motion.

- (C) - Mass of reactants = $12 + (2 \times 16) = 44 \text{ gm}$.
- Mass of products = $12 + (2 \times 16) = 44 \text{ gm}$.

Ismailia Governorate

18 Science Inspectorate

- 1 (A) 1. Mercury – Neptune.
2. Nobel gases – completely filled
3. mechanical – electric
4. ionic bond – triple covalent bond

(B)

Odd word	Scientific term
1. Train motion	Examples of periodic motion.
2. Earth	Outer planets.
3. Chlorine	Solid metals
4. NaOH	Acids

- (C) $\text{NH}_3 + \text{HCl} \xrightarrow{\text{conc.}} \text{NH}_4\text{Cl}$ (white clouds)
(Direct combination between compound and compound)

- 2 (A) 1. d 2. a 3. d 4. a
(B) 1. Carbon dioxide (CO_2)
2. Nitrogen oxides 3. friction force.
4. graphite

(C) Because safety belts work on stopping forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

- 1 (A) 1. Igneous rocks. 2. Oxides.
3. Force. 4. Chemical reaction.

- (B) 1. Carbon monoxide (CO)
2. Halley's comet.
3. Marble
4. Silver chloride (AgCl).

(C)

Point of comparison	Electromagnetic waves	Mechanical waves
1. Density :	Their speed is extremely high equals 300 million m/sec.	Their speed is relatively low.
2. Transferring through space :	They spread in all media and free space.	They need medium to transfer through and not transfer through space.

- 1 (A) 1. (✓)
2. (✗) _____ is galaxies
3. (✗) weak nuclear _____
4. (✗) Ozone layer protects _____

- (B) 1. d 2. f 3. e 4. b

(C) 1. Monovalent.

2. NaNO_3

Port Said Governorate

19 Science Inspectorate

- 1 (A) 1. X_2O
2. Plutonic - volcanic
3. mechanical - electromagnetic
4. $2\text{Mg} - \text{O}_2$
5. Earth's crust.

- (B) 1. white 2. Inertia
3. Strong nuclear forces.

4. sound waves

- (C) 1. Fe(OH)_3 2. Al_2O_3

- 2 (A) 1. b 2. d 3. b 4. b
5. n 6. d 7. a 8. b

- (B) 1. H_2SO_4
2. 7 atoms. 3. 3 elements.
4. Copper carbonate.
5. 5 atoms. 6. 3 elements.

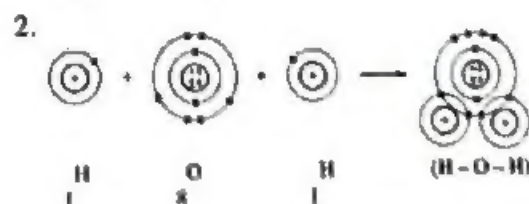
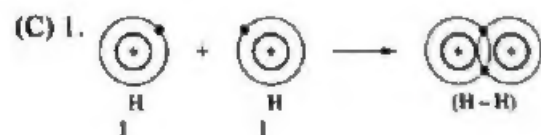
- 3 (A) 1. (✓) 2. (✗) 3. (✗) 4. (✓)
5. (✓) 6. (✗) 7. (✓) 8. (✓)

- (B) 1. Acid 2. Oxide
3. Salt 4. Base

- (C) 1. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
2. Because they consist mainly of gaseous bodies.

- 4 (A) 1. Sodium 2. HCl.
3. Friction force. 4. Jupiter.

(B) $\text{Mass} = \frac{\text{Weight}}{\text{Earth's gravitational acceleration}}$
 $= \frac{460}{10} = 46 \text{ kg.}$



Name :

Thickness :

- (d) 1. Earth's crust Ranges between 8-60 km
2. The mantle about 2885 km.
3. Inner core its radius about 1350 km.

Behlra Governorate

20 Science Inspectorate

- 1 (A) 1. transitional - periodic
2. $2\text{Mg} - \text{O}_2$
3. acids - bases.
4. quartz - mica

(B) 1. (x) 2. (✓) 3. (x) 4. (x)

(C)



- 2 (A) 1. Periodic motion. 2. Rocks.
3. Chemical reaction. 4. Valency.

(B) 1. They are used in medical purposes as the treatment and discovering of some swellings.

2. It helps in burning match.
3. They are used in making remote sets.
4. They are used in many industries such as manufacture of medicines.

(C) 1. Because Earth's gravitational acceleration changes from one place to another.
2. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

- 3 (A) 1. CaCO_3 . 2. larger than
3. respiratory system.
4. Motion

(B) 1. b 2. b 3. c 4. d

(C) 1. This means that the ability of the Earth to attract this object equals 60 N.
2. It is the change in an object's position or direction as time passes relative to another object or a fixed point known as frame of reference

- 4 (A) 1. Newton \Rightarrow planets
2. rivers \Rightarrow salty water
3. Soil \Rightarrow Earth's layers
4. Water waves \Rightarrow Electromagnetic waves.

(B) 1. c 2. a 3. d 4. b

(C) - Mass of reactants = $12 + (2 \times 16) = 44 \text{ gm}$
- Mass of products = $12 + (2 \times 16) = 44 \text{ gm}$.

El-Menia Governorate

21 Deirmwas official School for Languages

- 1 (A) 1. c 2. a 3. c 4. b

- (B) 1. Bases 2. third
3. periodic 4. double
(C) 1. $\text{Al}(\text{OH})_3$ 2. Na_2SO_4

- 2 (A) 1. The wonderer belt of asteroids.
2. Atomic group.

3. Object weight. 4. Bromine.

(B) 1. (x) 2. (✓) 3. (✓) 4. (✓)

(C) - Mass of reactants = $12 + (2 \times 16) = 44 \text{ gm}$.
- Mass of products = $12 + (2 \times 16) = 44 \text{ gm}$.

- 3 (A) 1. forward - inertia
2. Silver chloride (AgCl) - lead iodide (PbI_2)
3. head - tail.
4. plutonic - volcanic

(B) 1. Water waves 2. Halley
3. Mercury 4. HCl

(C) 1. They are used to sterilize the sets of surgical operations rooms.
2. It is used in producing electricity.

- 4 (A) 1. d 2. c 3. a 4. b

(B) 1. Earth's layers. 2. Earth's crust.
3. Mantle. 4. Inner core.

(C) 1. To achieve the law of conservation of matter (mass).
2. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic is much greater than that of mechanical waves.

Assiut Governorate

22 Science Inspectorate

- 1 (A) 1. red. 2. limestone.
3. Infrared (IR) 4. NH_4Cl

(B) 1. e 2. d 3. e 4. b

(C) object's weight = Mass \times Earth's gravitational acceleration
 $= 10 \times 28 = 280 \text{ Newton}$.

- 2 (A) 1. d 2. c 3. a 4. a

(B) 1. (a) 17 atoms (b) 3 elements.
2. (a) (✓) (b) (x)

(C)

Point of comparison	Electromagnetic waves	Mechanical waves
Speed	Their speed is extremely high equals 300 millions m/sec	Their speed is relatively low.

- 1 (A) 1. Na_2CO_3 ,
3. Salty

2. electricity.
4. graphite.

(B) 1. (a)



(O) atom

1. (b)



(O) atom

- 1- (c) double covalent bond.
2- (d) Earth's crust.
3- (e) Mantle

(C) Due to inertia, as they try to maintain their state of motion.

- 4 (A) 1. Inner Core.

2. Volcanic igneous rocks

3. Object's weight. 4. Moons.

(B) 1. H_2O

2. Sound waves

3. Saturn.

4. Work.

(C) Sodium chloride (NaCl).

Sohag Governorate

23 Sabry Abou Hussien Language School

- 1 (A) 1. double covalent - triple covalent.

2. electric - mechanical.

3. red - blue.

4. Mercury - Neptune.

(B) 1. Acid.

2 Metal oxide.

3. Salt.

4. Base.

(C) Object's weight = Mass \times Earth's gravitational acceleration
 $= 100 \times 9.8 = 980 \text{ Newton}$

- 2 (A) 1. Galaxy.

2. Periodic motion.

3. Chemical reaction.

4. Object's weight.

5. Light year.

6. Noble gas.

7. Meteors.

(B) 1. $\text{Al}(\text{OH})_3$

2. Na_2O

3. CO_2

4. H_2O

(C) 1. It changes into a positive ion.

2. A white powder of magnesium oxide is formed. $[2\text{Mg} + \text{O}_2 \xrightarrow{\Delta} 2\text{MgO} \text{ (white powder)}]$

3. The temperature of air increases as CO_2 causes the green house effect.

- 3 (A) 1. a

2. c

3. a

4. a

5. a

6. c

(B) 1. To achieve the law of conservation of matter.

2. Because the light of lightning is from electromagnetic waves, while sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.

3. Because safety belts work on stopping the forces of inertia to prevent the driver from being injured when a sudden change in motion occurs.

(C) 1. - It is used in respiration process of living organisms.

- It helps in combustion (burning) process of fuels.

2. It is used by green plants in photosynthesis process to form food for other living organisms.

4

(A) 1. Vibrating

2. mechanical

3. ionic bond.

4. three

5. celestial bodies.

6. Chemical

7. graphite.

(B) - Mass of reactants = $12 + (2 \times 16) = 44 \text{ gm.}$

- Mass of products = $12 + (2 \times 16) = 44 \text{ gm.}$

(C) 1.

Point of comparison	Inner planets	Outer planets
Size :	Small in size.	Big in size.

2.

Point of comparison	Metals	Non-metals
Number of electrons :	They have less than an (4) electrons in the outermost energy level	They have more than (4) electrons in the outer most energy level.

Qena Governorate

24 Science Inspectorate

- 1 (A) 1. Ionic bond. 2. mechanical
3. fourth 4. quartz
(B) 1. H_2SO_4 2. NaOH
3. Al_2O_3 4. $CaCO_3$
(C) Because the sunlight is electromagnetic waves which can travel through free space, while the sound of solar explosions is mechanical waves which can't travel through free space.

- 2 (A) 1. Positive ion. 2. Meteorites.
3. Force. 4. Granite.
(B) 1. Sodium. 2. Jupiter.
3. Sound waves. 4. Silver chloride.
(C) It is the number of electrons that an atom gains, loses or even shares during a chemical reaction.

- 3 (A) 1. c 2. b 3. b 4. a
(B) 1. White 2. inner core
3. inertia 4. X-rays
(C) Object's weight = Mass \times Earth's gravitational acceleration
 $= 0.5 \times 9.8 = 4.9$ Newton

- 4 (A) 1. (✓) 2. (✗) 3. (✓) 4. (✗)
(B) 1. d 2. c 3. a 4. b
(C) White clouds of ammonium chloride are formed.
 $[NH_3 + HCl \xrightarrow{\text{conc}} NH_4Cl \text{ (white clouds)}]$

Aswan Governorate

25 El-Qahmury Formal Language School

- 1 (A) 1. Light year. 2. Periodic motion.
3. Chemical reaction. 4. Jupiter.
5. Valency.
(B) 1. They are used in making remote sets.
2. They are used in photographing bones to detect the sites of bone fractures.
3. It is used in making electric bells.
4. They are used to sterilize the sets of surgical operations rooms.

- (C) 1. Because the light of lightning is from electromagnetic waves, while the sound of thunder is from mechanical waves, as the speed of electromagnetic waves is much greater than that of mechanical waves.
2. Due to inertia, as they try to maintain their state of motion.

- 2 (A) 1. Granite – sandstone.
2. electric – mechanical
3. ionic – double covalent bond.
4. Carbon dioxide (CO_2)
5. Iron – Nickel
(B) 1. $Ca(NO_3)_2$ 2. Al_2O_3
(C) 1. The normal atmospheric pressure.
2. The periodic time for rotation the Earth around the Sun.
3. The mass of the Earth.

- 3 (A) 1. spiral 2. rivers
3. 21% 4. lightning.
(B) 1. Base 2. Metal oxide
3. Acid. 4. Salt.
(C) object's weight = Mass \times Earth's gravitational acceleration
 $= 100 \times 9.8 = 980$ Newton

- 4 (A) 1. a 2. c 3. c 4. c
(B) 1. NH_4Cl 2. $2MgO$ 3. O_2
(C) 1.

Acids	Bases
They are substances which dissociate in water producing hydrogen ions H^+ .	They are substances, which dissociate in water producing hydroxide ions $(OH)^-$

2.

Inner planets	Outer planets
They are the nearest four planets to the Sun.	They are the farthest four planets from the Sun.

3.

Metals	Non-metals
They have less than (4) electrons in the outermost energy level	have more than (4) electrons in the outermost energy level.